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*The  
Collection  
of  
Agricultural  
Statistics  
in*

**JAPAN**



## PREFACE

This report, prepared on the basis of the author's stay in Japan from June 17 to August 6, 1965, on a mission for the Statistical Reporting Service, relates to the statistical program of the Statistics and Survey Division, Economic Bureau, Ministry of Agriculture and Forestry, Japan. This 7-week period was devoted primarily to interviewing officials in the Statistics and Survey Division of the Economic Bureau of the Ministry of Agriculture and Forestry, both in Tokyo and in several Prefectures (roughly comparable to States in the United States), together with visits to a number of agricultural areas and several farm homes. It included also a shorter series of interviews with officials of the Statistical Standards Bureau of the Administrative Management Agency and of the Bureau of Statistics, in the Office of the Prime Minister.

Plans for the study were developed in conferences with Mr. Shigera Kida, Director of the Statistics and Survey Division, Mr. Kunio Seto, Chief of the Administrative Management Section of the Division, Mr. Takeo Aoki, Chief of the Crop Statistics Section, Mr. Ryoji Horie, Chief of the Economic Survey Section, Mr. Hiroshi Wake, Chief of the Agriculture and Forestry Section, Mr. Takeshi Nakamura, Chief of the Fisheries Section, Mr. Fukuitsu Aoki, International Section of the Bureau, Mr. Aritune Furukawa, Liaison Officer, Mr. Joseph Dodson, U.S. Agricultural Attaché, and Mr. Takeo Takeshita of the Attaché Staff.

Interviews with Ministry officials devoted to explaining Japanese agriculture and the principal statistical procedures involved in the programs of the Division occupied about a month. These programs are directed primarily to developing statistical information for the Ministry to use in determining agricultural policy in a country in which the balance between demand and supply of food products continues always to be crucial. Much of the statistical information is published for use of the general public, some with English as well as Japanese text.

A field trip from July 19 to 27 afforded opportunity to visit the Prefectural offices in Nagano, Tsu, Kyoto, and Shizuoka, in the Nagano, Mie, Kyoto, and Shizuoka Prefectures. Intervening travel across the Saitama, Gumma, Gifu, Shiga, and Aichi Prefectures afforded a cross section view of agriculture in central Japan.

Mr. Masao Goto, Director of the Statistical Standards Bureau, and Mr. Yutaka Kitagawa, Statistical Clearance Officer, very generously explained the work of their organization and its relation to the general statistical program of the Japanese Government.

Mr. Hiroshi Midzuno, Bureau of Statistics, Office of the Prime Minister, provided information concerning the statistical programs of his office, particularly the population census, the retail price survey, and the household economic survey for nonfarm and nonfishery family households.

The author wishes to express his very great appreciation to the many officials of the Ministry of Agriculture and Forestry, both in Tokyo and in the Prefectures, to officials of other agencies, and to the farm families visited, for the very cordial reception extended at every turn and the insight into Japanese life and agriculture afforded thereby.

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1. The Statistics and Survey Division of the Economic Bureau is the primary statistical and survey agency of the Ministry of Agriculture and Forestry. Data collected and published by the Division relate to the physical and economic aspects of Japanese agriculture, such as, but not limited to: (a) the general structure of agriculture, forestry, and fisheries; (b) acreage, production, yield, livestock numbers and products; (c) management characteristics of farm units, including farm family income and expenses, cost of production of farm products, and farm management studies; (d) processing and distribution; and (e) numerous collateral aspects of the economy relating to agriculture, forestry, and fisheries, such as prices, demand and supply of products, statistics of inputs, cooperatives, land transfers, and so on. The Division is responsible for taking the decennial and quinquennial Censuses of Agriculture.

2. Coordination between the activities of this Division and its counterparts in other ministries, as well as some generalized supervision at the top governmental echelon is provided by the Statistical Standards Bureau of the Administrative Management Agency (the equivalent of the U.S. Office of Statistical Standards of the Bureau of the Budget).

3. The Statistics and Survey Division has a central staff in Tokyo; a staff in each of the 49 Prefectures (corresponding to State offices of the Statistical Reporting Service in the United States); and a staff in each of the 787 branch offices of the Prefectures (averaging about 16 per Prefecture) as well as in the villages. This provides a straight line organization from Tokyo to the village level.

4. Extensive use is made of probability sampling along lines indicated by modern sampling theory. Two major sampling frames are used for sample design:

a. The enumeration districts and listings of farm family households from the Census. Since the Census is taken by the Division of Statistics and Surveys through the Prefectural offices and their branch offices, full information is available for use in sampling. This sample frame is used for surveys relating to the farm considered as an operating unit--for example, surveys concerning numbers of persons engaged in farming, their characteristics, changes in the number, income, cost of production; number of farm households raising various crops, keeping livestock, owning various types of farm machinery, belonging to cooperatives.

b. A set of maps comprising virtually the entire arable land of the country. The land area is divided in plots or tan-i-kus, which average a little under 2 hectares (5 acres) in size and number around 3 million. Each tan-i-ku is bounded by identifiable characteristics, such as a river, road, dyke, or canal, and is numbered and identified on the maps. The tan-i-kus are classified by a detailed set of strata and substrata representing both physical and economic characteristics. This cross classification provides a grid, with number of tan-i-kus in each cell, and is used as a sampling frame for major surveys relating to area in crops and yields.

5. Most statistical surveys are made by personal enumeration by staff representatives; mail surveys with or without follow-up are used largely for supplementary purposes. Visual inspections, or "round surveys," by experienced staff members, are utilized. Agricultural technicians, such as silk-worm specialists, are utilized in the data collection process.

6. A Basic Survey is made once a year covering about 187,000 farm family households. This relates to basic farm characteristics as of December 1 of each year; it

is supplemented by a Quarterly Survey of half this number of households for the collection of data used in forecasting crops, livestock, and livestock products. Acreage and yield surveys are made from time to time as necessary to determine crop progress during the growing season, to make forecasts, and to estimate final production of important crops. An elaborate series of surveys of cooperatives channel information on a wide variety of subjects from this important source for use in the Ministry.

7. An elaborate series of reports is issued from time to time--some reports at the national level and some at the Prefectural level, covering the many and varied phases of agriculture. The Yearbook of the Ministry provides a 700-page compendium of over 20 chapters of statistics relating to Japanese agriculture, based largely on the surveys of the Division of Statistics and Surveys.



## THE COLLECTION OF AGRICULTURAL STATISTICS IN JAPAN

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### INTRODUCTION

The system of statistics collection in Japan may be characterized as decentralized and coordinated. It is decentralized in that statistical activities and programs are conducted by the several Ministries as required for the effective administration of their programs. It is coordinated through the activities of the Statistical Standards Bureau of the Administrative Management Agency in conjunction with the Ministry of Finance. The former agency provides technical review and coordination; the latter, after considering recommendations of the former, determines the gross resources available to the Ministries, without, however, exercising direct and specific control of details of their statistical operations.

From the standpoint of National versus Prefectural operation, the Japanese system seems generally more centralized than that of the United States. Some agencies--notably the Ministry of Agriculture and Forestry--directly operate a statistical organization in each Prefecture. That of the Ministry of Agriculture and Forestry is one of the most elaborate, with branch offices, village offices, and local enumerators covering virtually the whole nation. Some other national agencies--the Bureau of Statistics of the Office of the Prime Minister, Ministry of Health and Welfare, and Ministry of Construction, as well as others--"entrust" their Prefectural level operations to statistical agencies ostensibly under the direction of the Prefectural Governors. The Prefectural governments select personnel for these agencies--subject to civil service tests--and utilize them to some extent for statistical inquiries of local interest. However, about 90 percent of the expenses of these offices is said to be paid by the national government. For the programs "entrusted" to the Prefectures, the national agencies issue detailed directions. Moreover, much of the activities of the Prefecture statistical agencies consists of the "entrusted" programs. Apparently, the belief is that the Prefectural governments will take more interest in the work if they have a direct element of responsibility, even if they actually operate under national subsidy and close supervision.

According to the Statistical Standards Bureau, the number of national public officials in the field of statistics is about 5,400 (7).<sup>1/</sup> Of these, 2,470 are in the Bureau of Statistics of the Office of the Prime Minister, about 890 in the Ministry of Health and Welfare, 650 in the Ministry of International Trade and Industry, 500 in the Ministry of Agriculture and Forestry, and the remainder in several other ministries.

Statistical personnel in the local branches of the national government number about 13,500, of which about 12,520 are in the Ministry of Agriculture and Forestry.

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<sup>1/</sup> Figures in parentheses refer to Literature Cited, page 50.

Personnel engaged in statistical work in what the Japanese refer to as "local public entities" are estimated at about 10,500 including those in municipalities.

None of these figures include enumerators, which the Statistical Standards Bureau estimates at 232,000 for "designated" surveys in 1963 and 98,000 for these in 1964.<sup>2/</sup> Evidently, about 210,000 enumerators worked on the 1960 Census of Agriculture and Forestry.

There are also, as in the United States, a considerable number of banks, trade associations, and other private entities that issue various types of statistical reports. In fact, a Federation of Economic Organizations exists as a sort of counterpart (for private statistical operations) of the Statistical Standards Bureau. It publishes a 300-page book listing statistical publications by private organizations. Of the 300 pages, 250 are devoted to private listings and 50 to governmental. Many of those listed are small organizations, and the relative number of pages of listings does not indicate relative importance. In the case of some of the private activities, there is a degree of governmental cooperation. It appears that the overwhelming preponderance of statistical activity in Japan centers in the national government.

For many years--at least since the Meiji Restoration in 1868--the Japanese have been "statistics-conscious"--that is, aware of the need for quantifying information about their society (3). Naturally, many changes have occurred over the years in the organization of such activities, and it is not the function of this report to trace this history. However, the period of the Occupation marked some sharp changes in procedures, and may be considered to mark the beginning of the present statistical era. This stemmed in part from the critical need for improved information about the economy, especially the food aspects. It stemmed also from the dominance of American influence during that period.

The present program in crop and livestock statistics owes much to the work of Mr. Floyd K. Reed.<sup>3/</sup> In the coordinating field, the influence of Dr. Stuart Rice is clearly evident and is acknowledged by present leaders in Japan. The Statistical Standards Bureau, set up as a part of the Administrative Management Agency--itself a part of the Prime Minister's Office--is a clear counterpart of the Office of Statistical Standards in the U.S. Bureau of the Budget. So, too, certain basic legislation relating to statistical activity is in some degree reflective of the pattern in the United States.

The Statistical Standards Bureau of the Administrative Management Agency is the national statistical coordinating organization.

"The Statistical Standards Bureau, with an aim to secure the truthfulness of statistics, to eliminate the duplication of statistical investigations, to consolidate the system of statistics, and to improve and develop the statistics and the statistical system, deals with the following affairs in conformity with the Statistics Law, the Statistical Reports Coordination Law, the Administrative Management Agency Establishment Law and so on (7, p. 1):

"(1) To designate the statistics from among those which the government or local public entities compile ....

"(2) To make overall coordination of statistics and statistical surveys.

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<sup>2/</sup> The term "designated" relates to a large and important group of surveys conducted under certain laws as described later in more detail. See page 3.

<sup>3/</sup> The work of Mr. Reed is described in several pages of a book "Fireside Talks on Statistics" (4) by Michitatsu Koga, until recently Chief of the Statistics and Survey Division of the Ministry of Agriculture and Forestry.



- "(3) To coordinate statistical reports....
- "(4) To establish statistical standards of various kinds.
- "(5) To manage and consolidate the statistical organizations of local public entities and train their personnel.
- "(6) To plan and approve training of statistical personnel, diffuse statistical knowledge by setting up courses on statistics and plan fundamental matters concerning the improvement and development of the statistical system.
- "(7) To integrate international statistical affairs."

In the Administrative Management Agency, there is a Statistics Council consisting of "7 persons of statistical knowledge and experience, 7 officials representing organizational units in charge of statistics in central and prefectural government offices and 4 persons representing the users of statistics..."(7, p. 1).

The Council has 18 committees representing various subject matter areas including sampling surveys, national income, classification (3 committees), indexes, income and expenditure of households, food consumption, industrial statistics, and agricultural statistics.

These committees, chaired by a member of the Council and including a representative of the agency whose problems are under review, work in cooperation with the Standards Bureau personnel to provide the mechanism for working out problem areas in the various subject matter fields and with the several Ministries.

The primary legislation affecting the Statistical Standards Bureau consists of the Statistics Law (effective May 1947) and the Statistical Reports Coordination Law (August 1952). These provide for certain statistics to be "designated" by the Director General of the Administrative Management Agency as to source of data, and impose reporting obligations on respondents, insure protection of the confidential nature of reports, and establish other conditions for collection and publication. The act of "designation" gives them a certain preferred status, and places certain special obligations on the compiling agencies, including review, and securing an approval number and expiration date. The Statistical Standards Bureau conducts no statistical programs.

In the United States, the programs most closely related to the work of the Statistical Reporting Service are those of the Bureau of the Census (Census of Agriculture and Census of Population), the Department of Labor (Consumer Price Index, Wholesale Price Index, Consumer Expenditure Surveys, and Employment), and, in the Department of Agriculture, the Market News Service.

In Japan, these fields are covered by the Ministry of Agriculture and Forestry, the Bureau of Statistics of the Office of the Prime Minister, the Labor Statistics Research Division of the Ministry of Labor, and the Bank of Japan (principal wholesale price index).<sup>4/</sup>

Great importance is attached in Japan to the matter of family income and expenditures, as evidenced by the intensity of surveys and the frequency of published data. For this purpose the universe of inquiry is divided into 4 parts:

1. Households not primarily dependent on agriculture or fishery occupations.

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<sup>4/</sup> Inasmuch as this report deals primarily with agricultural surveys, the procedures of other agencies were not studied in detail. For information on the major nonagricultural statistical series, see introductory pages in the Supplement to the Monthly Statistics of Japan, issued by the Statistical Standards Bureau.(7)

2. Households primarily dependent on agricultural activities.
3. Households dependent primarily on fishing.
4. Households dependent primarily on forestry.

The first category is surveyed by the Statistics Bureau of the Office of the Prime Minister. In addition to excluding farm and fishing families, this survey excludes single-member households and certain other untypical households. Data are published by months and years in the "Family Income and Expenditure Survey" issued monthly by the Bureau of Statistics. The tables report monthly receipts and disbursements per household for a very comprehensive set of major and minor categories. Data are summarized for all households in the sample, and by various subcategories, such as size groups of cities, geographical districts, occupational groups, income groups, and prefectures.

The sample is a 3-stage sample. For the first stage, about 170 municipalities are selected from a nationwide stratification; for the second, unit areas are selected out of each city, town, and village; for the third, households are selected. The total sample is about 8,000 and is rotated one-sixth every 6 months.

Survey households are required to enter expenditures and receipts in a record book and to submit the record twice each month for review, summary, and eventual publication.

(A similar but larger survey covering about 34,000 households was made in 1954 and 1964, and is scheduled for repetition each 5 years.)

The second category is surveyed by the Ministry of Agriculture and Forestry in the Farm Household Economy Survey which in character and detail is generally comparable to the survey of the first category except that expenditures include those for production as well as living purposes.

The third category is surveyed by the Fisheries Statistics Section of the Division. This survey relates primarily to the fishing areas excluded from the second category.

The fourth category is surveyed by the Agriculture and Forestry Statistics Section of the Division.

In describing these surveys, the Supplement states: "These ... surveys seem without parallel in the world from the regard of their history and scale" (7, p. 122). Few would dispute this statement.

#### BRIEF DESCRIPTION OF JAPANESE AGRICULTURE

Japan has a total land area of 37 million hectares (about 91.4 million acres) of which 6 million (14.8 million acres) are cultivated, 24.2 million are forest, and nearly 7 million are classified as "other". With the product of these 6 million cultivated hectares, together with a bountiful catch of fish and some imports, a population of nearly 100 million people is fed. Translated into American measure, this is about one-sixth of an acre per person, as compared with about  $2\frac{1}{2}$  acres in the United States.

This simple fact--plus the terrific food shortage at the close of the war still fresh in the minds of thousands of Japanese--explains the intense preoccupation of the Ministry of Agriculture and Forestry with making sure that a busy population is fed regularly. The population density alone explains the intensive agriculture that has characterized Japan for generations and promises to do so for many to come.



Fully half of this 6 million hectares is in rice--mostly paddy fields. Nearly 2.7 million hectares are in upland fields (fields without irrigation), some 480,000 hectares are in orchards, and 110,000 are in grassland (8). Rice provides nearly half the value of total agricultural output (excluding fishery), over twice that of its rapidly growing nearest rival, livestock and livestock products. In only 2 Prefectures is rice exceeded in value by any other crop or livestock groups. Wheat, barley, oats, and rye utilize 1.225 million hectares (some double-cropping with rice); sweetpotatoes utilize over 300,000, white potatoes about 200,000, pulses 550,000, and vegetables over 600,000 hectares.

Four hundred thousand farms keep an average of 3 milk cows per farm; 1.7 million farms average nearly 1-1/3 draft and beef cattle per farm; 700,000 farms average nearly 5 pigs per farm; 3.5 million farms average nearly 40 chickens per farm.

Of the total agricultural income in 1962 of 2,312 billion yen, rice provided 1,046; livestock products, 407; vegetables, 239; and fruits and nuts, 162 billion (8).

In traveling from Tokyo to Nagano to Tsu to Shizuoka, and up the coast to Tokyo, the paddy field is never out of sight, save when the train passes through tunnels.

On the Kanto Plain around Tokyo, the paddy fields extend as far as the eye can see--rich rectangles of green, with sunlight reflected from the water partially hidden by the growing rice. On the plain the fields approximate the rectangular--perhaps on the order of 30 x 50 feet, although far from regular. As the elevation increases, each field rises a little above its neighbor, separated by a dyke built generations earlier. As the terrain becomes rougher in the mountain valleys, fields become more irregular in shape, the dykes and terraces higher. But the paddy fields continue wherever a spot of land can be leveled for the water--terrace after terrace, the fields smaller and more irregular, tailored to the terrain, nudging the ever-climbing railroad track as it follows steep grades up to tunnels at the summits. And on the other side, more paddy fields, stretching down a widening valley towards Nagano.

Along the mountain slopes too steep for rice are patches of mulberry, neatly trimmed to shoulder height or lower, from which leaves are picked to feed the millions of silkworms that grow in the Nagano area--3 broods a year. Slightly less than half the farm families in Gumma, Nagano, Saitama, and Yamanashi--adjacent Prefectures--produce half the total cocoons of Japan.

Also in the Nagano area are found nearly a sixth of the apples. Only Aomori at the north end of Honshu outdoes Nagano, and these 2 Prefectures produce three-quarters of the apples grown in Japan.

Somewhat less in evidence than either fruit or sericulture, livestock provide more income to Nagano farmers, but less than a third as much as rice.

Enroute to Mie Prefecture, through or near the Japanese Alps, the paddy fields continue. The forests on the mountains provide a green backdrop to the valleys with their rice, and husband the rain and snowfall for irrigation and power. A rigorous practice of reforestation maintains the forest cover as trees are removed for timber and wood.

In Mie, where rice produces over half the gross value of farm products, is an experiment sponsored by the Ministry and the Prefecture, in which a farmers' cooperative has pooled the rice paddies of its members and rearranged the dykes so as to give larger and more rectangular and regular fields more adaptable to mechanized operation. Planting by seeder directly in the paddy field, instead of by the tedious conventional hand transplanting, is being tried, and also harvesting by combine.



Initially, yields were lower than by the more tedious methods, owing in part to shatter in harvesting and in part to planting in rows too far apart. However, with realignment of the planter and somewhat earlier harvesting there is some prospect of success. Here is an effort to apply mechanization to reduce the fantastic amount of hand labor involved in producing this most necessary crop. But the problems of mechanization on the small paddies on steep hillsides are staggering and may challenge man's best efforts for some time to come.

In Mie, too, one finds the Japanese cow--Wagyu. Bred in the mountains and brought to the lowlands for feeding to an age of 3 or 4 years and to a fat condition that belies the precarious food balance of the nation, the Wagyu is strictly a luxury item. Contrary to Western practice, the female is the most prized for meat. The male is likely to find himself relegated to a life of toil as a draft animal. But the female leads a pampered--albeit a shorter--life. Fed a grain ration partly imported from the United States, including beer to whet her flagging appetite, kept in a stall to limit exercise, and rubbed down to promote "proper marbling of fat," she ends up on the gourmet's table as Matsuzaka beef at a fancy price. Cooked over a charcoal grill and dunked in a sauce, the meat is indeed tasty.

In the Mie Prefecture, too, is found a heavy concentration of aquiculture--seaweed, shellfish, and pearl farming. Home of Mikimoto, who developed the cultured pearl, the industry affords employment for hundreds of pearl farmers. In this area, too, seaweed is harvested, dried, and pressed into thin sheets of "Nori," a highly prized food item in Japan. Likewise, many shallow water sea products are harvested.

Traveling northeastward into Shizuoka Prefecture through a rough terrain in which ridges from the mountains come down to the ocean, necessitating frequent tunnels, the ever-present rice paddy occupies whatever level land there may be, but on the hillside and up the valleys the rows of tea plants--rounded hedges of green perhaps 2 feet across and with just room for a person to walk between them--extend over and around the hills, sometimes in large fields, sometimes small, but always orderly and uniform.

Other parts of the hillsides are planted to the Mandarin orange. The hillside plantings are steep, and cable lifts, anchored on the valley floor and well up the hillside, carry fertilizer and supplies to the workers in the orchard and the baskets of oranges down to the farm headquarters. Sometimes the tea hedges are interplanted among the orange trees. The orange is a profitable crop, and the life of an orchard may be 70 to 80 years. Trees are grafted, with the fruiting body grafted onto a hardy native stock.

In this area, too, was visited a greenhouse growing foot-long cucumbers. The cucumbers are planted with squash, and when both are nicely started, a cucumber and a squash plant are tied together, effectively accomplishing a grafting of cucumber to squash. The latter provides a vigorous root stock, the former a tasty giant fruit which is kept growing straight by a small splint tied to it.

The Hokkaido area was not visited, but its agriculture is said to be much like that of New England. Less rice, more potatoes, and more milk cattle distinguish Hokkaido from Honshu. The climate is perceptibly cooler, and considerably more rigorous in winter.

## ORGANIZATION AND GENERAL ADMINISTRATION

The statistical program of the Japanese Ministry of Agriculture and Forestry is oriented in terms of the total program of the Ministry and, in a sense, of the government as a whole. That program is directed to finding solutions to some very real problems in Japanese life:

1. How can the food supply for a growing nation be maintained in face of limited resources and intense competition for labor?
2. How can agriculture compete successfully for workers in an economy in which the gap between the standard of living of nonagricultural workers and that of agricultural workers has been widening.
3. How can the standard of living of agricultural workers be raised to the level of the industrial group?

In one sense these are merely three phases of the same problem but, however they may be regarded, the Ministry is concentrating upon them and devoting its efforts to finding solutions. The responsibility of the Statistics and Survey Division is to supply the quantitative information necessary for intelligent and informed policy formulation and implementation.

The Occupation gave both a considerable impetus and no small amount of redirection to statistical activity in the realm of agriculture, an impetus and redirection that found enthusiastic reception in the Japanese temperament and culture. Numerical records abound in Japanese history. For example, a record of the eruptions of Mt. Fujiyama goes back at least to 781 A.D. With the Meiji Restoration, surveys were initiated regarding agriculture, forestry, and fisheries. The first land survey was made in 1869, a "produce survey" in 1870, and a more complete land survey in 1873, to cite some examples. Although the initial purpose was to provide a basis for revenue to the central government, the course of events was such as to require continued and expanding information as a basis for formation of agricultural policy (3,5,9). As in other governments, reorganization and redirection occurred from time to time, but the need for more information and for more accurate information developed persistently, even though the form of government went thru a long period of evolution, and the problems faced changed from time to time.

The present organization conducts an imposing attack upon the problems involved in collecting the wide variety of information needed in a vigorous and growing economy in the modern world. It utilizes modern statistical procedures and techniques.

The Statistics and Survey Division of the Ministry has a budget of ¥ 10 billion (about \$27.8 million). It employs on the national payroll a regular staff of 13,000 employees throughout the whole of Japan, down to and including the villages, together with about 80,000 cooperators not on the regular payroll but paid on a when-actually-employed basis. The Tokyo office provides central direction and program formulation; Prefecture and branch offices adapt general instructions to the specific circumstances of the Prefectures and subareas; and the field staff makes the field contacts incident to collecting data from farmers and others, performs the many functions involved in making field counts and weighing samples, and conducts a variety of field inspections as directed by the Tokyo office. The Division collects a wide range of data relating to agriculture, forestry, and fisheries, makes an imposing list of forecasts of crop and livestock production, and conducts a number of peripheral activities facilitating the interpretation and enhancing the usefulness of the data collected.

The Division consists of 5 sections, with major responsibilities as indicated below:

1. Management Section--Handles personnel, budget, accounting, and other housekeeping functions. In addition, it provides a planning function and consulting



services of a small staff of mathematical statisticians and operates the tabulating and computing facilities incident to summarizing the vast amount of information coming into the Division. The Management Section also makes surveys of the distribution of agricultural commodities, and the prices at which they move through the marketing system.

2. Crop Statistics Section--Collects data and makes estimates on acreage and production of about 100 crops, including both forecasts and final estimates. It is also called upon for estimates of crop damage from various causes such as low temperature, disease, hail, drought, insects, and typhoons.

3. Economic Statistics Section--Investigates the farm family economic situation, and in connection therewith maintains a sample of 15,000 families (they are paid ¥3,000 per year to keep records) whose records provide at least part of the data used by the Section. It also makes extensive cost-of-production studies, of which it maintains samples of about 5,700 farmers for rice, 2,400 for wheat and barley, 1,400 for cocoons, 1,500 for milk, 1,500 for hogs, and 1,000 for eggs. These farmers keep records of their expenditures and hours worked. The Section also maintains a sample of 4,400 farmers who report to a staff member the prices they receive for their products; it sends staff members to interview dealers for current prices of items bought by farmers.

4. Agriculture and Forestry Statistics Section--This section is responsible for the conduct of a complete census in 1960 and another in 1965, with another scheduled for 1970, and for a sample survey of about 175,000 farms (with some supplementary samples for special purposes) in the intermediate years. The purpose of these is to provide data on acreage, livestock, number of farms producing the various crops, and a number of related items, together with extensive information concerning forest products.

5. Fisheries Statistics Section--Collects extensive data concerning the monthly catch of fresh and of salt water fish. Conducts a census each 5 years and maintains a current sample of about 30,000 fishermen for number and tonnage of boats and amount of fish caught. The section also makes an economic survey of fishermen, and for this purpose has a sample of 1,000 fishermen families, and about 760 fishing companies and fishing cooperatives. The families keep a record of purchases of oil, nets, and other supplies bought for their fishing activities. They are paid a small amount for keeping this record.

In addition to the staff in Tokyo, the Ministry has 49 Prefectural offices, 45 of which are in Honshu, Shikoku, and Kyushu, and 4 of which are in Hokkaido, the most northern island of the 4 main islands comprising Japan. There are 787 branch offices of the Prefectural offices--usually about 16 per Prefectural office. The latter are tributary to the Prefectural offices and provide the means of effecting contacts with farmers and other cooperators, extension specialists, or others from whom the Ministry desires information. The Prefectural offices operate in a manner parallel in many ways to the State Statisticians' offices of the Statistical Reporting Service in the United States, but the branch and village offices provide the means for local contact and inquiry not equalled in the United States.

The total staff of the Division numbers about 13,000 of which about 500 are in Tokyo, 4,000 are in the Prefectural offices, and 8,500 are in the branch and village offices. These have around 8,000 helpers in all, many of whom receive perhaps ¥500 to ¥30,000 per year. This is low pay even though much of the work is on a part-time basis, and it is said to be difficult to get cooperation.



Data collected from farmers in the enumeration districts and from cooperatives, village, or other local sources are usually initially summarized in the branch offices, with summaries and often the original record being sent on to the Prefectural office and often to Tokyo, particularly in cases in which the original data are punched directly from the original record. In other cases a coding sheet is prepared in the branch or Prefectural office for use in machine processing. As of the present, something like 10 to 20 percent of the summarizing is done by machine, the balance manually, making extensive use of the abacus.

Employment is on the basis of a standard examination given in the field at 2 levels, first- and second-class. The first-class examination is for college graduates; the second-class for high school graduates.

The staff members who perform the field office contacts and the analysis are high school graduates in agriculture. After graduation they receive some special training for perhaps a month. Most of the central direction flows from the Tokyo sections to the heads of the Prefectural offices.

As yet there is little specialized statistical training given in the colleges and universities, and many of the top administrative people are law school or economics graduates. Technicians can frequently reach the section head level, but rarely if ever the division head level. A few mathematics majors have found their way into the field of mathematical statistics, and some of the technicians have studied technical statistics more or less independently. The opportunity to take advanced training in the United States, India, or elsewhere, is offered to a limited number of promising young men.

Each year about 200 new members are added to the staff--perhaps 4 to 10 are college graduates, most of which go to the Tokyo staff. However, perhaps 10 percent of the upper echelons of the Staff in the Prefectures are college graduates.

There are about 5 Mathematical Statisticians in the Division, all in the Management Section. They are, however, assigned to other sections as needed. They tend to be regarded as consultants, useful in the designing of new surveys, but not utilized heavily thereafter, and certainly not regarded as being in the regular hierarchy.

Some training is given in statistics on an in-service basis, with the guidance, assistance, and encouragement of the Statistical Standards Bureau, which has prepared a textbook for new staff members. Sessions of about a week once a year are held in various field locations. Practical instruction is given. Evidently, little or no theory is taught in such sessions.

Promotion time comes twice a year. Evidently there is a quota limitation. Section heads make recommendations, based generally on years of service and special merit. Higher authority makes final decisions.

Supervision of the Prefectural offices is fairly rigid and there is little room for independent action. The program instructions are manualized to a large extent. It is customary to have several conferences a year of the heads of Prefectural offices and occasional conferences of others. Section heads and branch chiefs make some visits to Prefectural offices. However, travel funds are limited.

It appears that estimates are usually made at the Prefectural level, but data are reviewed at Tokyo. However, it does not appear that the same formality exists concerning an "estimate" as in the case of the U.S. Statistical Reporting Service. In the absence of outright appearance of error, the data coming from the sample, sometimes with statistical adjustments, are regarded as final.

In many, if not all, Prefectures there are statistical sections that are part of the Prefectural governments and operate more or less autonomously under the jurisdiction of the Prefectural governors. They are, nevertheless, heavily subsidized by the national government and, on the programs "entrusted" to them by various of the Ministries, they operate under detailed instructions. At least some information collected by the Prefectural sections is available to the Ministry of Agriculture and Forestry Prefectural offices, and although it appears that no formal cooperation exists between them, there is close informal cooperation.

For the most part, the Prefecture government statistical offices stay out of the agricultural field, and other ministries "entrust" more functions to them than does the Ministry of Agriculture and Forestry. Cost-of-production surveys, however, are an exception, as there is considerable local interest in this statistic, especially for rice. In this case it was explained that since the sample for the Ministry's survey is small in any locality, results are published only at the national level, thus avoiding direct conflict with findings from local surveys.

The most comprehensive source of information concerning Japanese agriculture is the Quinquennial Census, which is taken by the Ministry through the Division of Statistics and Surveys.

The other major source of information is an ambitious series of sample surveys conducted by the Division. For the most part these are conducted by the staff of the Ministry using probability sample designs. Two main sampling frames are utilized for the surveys relating to farm households, acreage, and production:

1. The complete listing of farm family households by enumeration districts provided by the Census of Agriculture. The enumeration district in general provides the primary sampling unit, and the farm family household the secondary sampling unit. The enumeration districts are stratified by economic and physical characteristics, permitting considerable flexibility in sample design. This sampling frame is used for surveys in which the subject of inquiry focuses on the characteristics of the farm as an operating unit.

2. A classification of virtually all the arable land in Japan by 2-hectare units. (Only remote mountainous or island land seems to be excluded.) These units are mapped, identified by number, and classified by physical and economic characteristics, so as to facilitate the design of surveys relating to land use, acreage in various crops, and yields. Sufficient data are available concerning the characteristics of and variability within the various strata to permit highly sophisticated sample designs.

Surveys relating to marketing and distribution are a relatively new development. Here again, probability sampling is used extensively, and makes use of sampling frames consisting of what appears to be remarkably complete listing of the villages, firms, or other units of inquiry at various stages in the marketing process.

The following sections of this report take up in more detail the activities of the Ministry's Statistics and Survey Division, and describe the more important agricultural statistical series and surveys.

#### DISTRIBUTION SURVEYS

Historically, the primary subjects of Japanese agricultural statistics were the quantities of food and industrial crops produced, prices related thereto, and the adequacy of supplies for feeding and clothing the people of the nation. As the postwar economy developed, and particularly as booming industrial development attracted labor away from the farms, not only did the urban demand for food increase, but the shortage of labor at the farm affected the capacity for production. Recently, food prices increased sharply relative to other prices, with the result that the urban population complained.



Accordingly, the Ministry has undertaken extensive studies concerning the methods of marketing, the price differentials between the various steps in the process, the costs and profit margins involved, and the possibility of increasing the efficiency of the process.

So far, primary attention has centered on food products (except rice), inasmuch as the marketing of industrial products--hemp, cocoon, sugar beets, and rapeseed (oil)--is handled very largely through private contracting, so that price data are more readily available. Rice is excepted from these studies for the reason that its marketing is already almost wholly under government control.

Attention and interest center on vegetables, fruit, eggs, fish, and meat, as prices for these foods have jumped the most. The approach has been first to identify the steps in the marketing process, then to identify the institutions participating in each step, and finally to establish procedures for collecting the pertinent information.

Transportation has been identified as an important step, and attention is being directed to what is involved at various stages, and possible improvements. Incidentally, little refrigeration of transportation facilities is available, and most of that is used for fish and meat. Of the 140,000 freight cars in Japan, only 4,500 are refrigerated; and of 1.4 million trucks, only 500 are refrigerated. During the Occupation, greatly improved refrigeration facilities at the docks were provided for handling the output of the fishing fleets.

Soon after the Occupation, steps were taken to improve the Japanese marketing system. For example, large markets were established in some of the large cities under the regulation of the mayors, with national subsidy and direction. There are about 23 large cities with large wholesale markets operated by the cities, and some 290 other cities with privately operated markets.

There are 3 main marketing channels through which goods move from the producer through the wholesale market to the retailer:

1. Commodity cooperatives. These are cooperatives specializing in one or two commodities, and providing packing, sorting, labeling and marketing services, such as for oranges, fish, and cocoons. These tend to be located in specialized areas.
2. Village or unit cooperatives. These are general cooperatives, embracing all or nearly all the farmers in a village. They often both buy supplies for members and sell their products. This type of cooperative, numbering about 13,000, exists in nearly every village and often--perhaps usually--has membership in a prefecture federation of cooperatives. They do not specialize by commodity, but usually as a minimum handle vegetables and eggs. This type of cooperative is of many years' standing.
3. Private dealers. Meat is a commodity handled to a considerable extent by private dealers.

Collection of data from co-ops is not difficult. The inquiry includes number members, capital, facilities furnished, services performed, and where the commodities handled are shipped. Much the same inquiry is made to dealers, and all are handled on a sample basis except for the larger operations. It appears that the information system provides a virtually complete list of operating firms and entities at all levels.

In the 23 big-city markets and the 290 other markets the receiving agency may be either cooperative or other. Much of the produce comes in on consignment for sale to middlemen who often sell to retailers by auction. Data collected include type of commission, quantity sold, price, and related information. The record forms are very detailed.



In the wholesale market there may be one, several, or many types of firms or institutions operating. Generally data are collected from all the commission men and from a sample of the middlemen, with the data collection tailored to the marketing pattern by type of commodity.

### Commodity Oriented Surveys

#### Rice

Cooperatives handle the entire crop, so that data are easily available. Moreover, the government sets the price with a view to the needs of both consumer and producer, and controls virtually the whole distribution process.

#### Vegetables

Since most vegetables are marketed through the village co-ops or other institutions in the respective areas, statistics are gathered through the village organizations in the main producing areas.

Villages are classified for each commodity into 4 classes:

- a. Class "A" are villages which ship to the 7 large markets of over 1 million population. These account for 50 percent of the production.
- b. Class "B" are villages shipping to the smaller towns.
- c. Class "C" consume their produce locally.
- d. Class "D" purchase from another village.

This village classification is printed in a large book of over 200 pages, covering the whole of Japan. The left hand stub of each page lists the commodity, the caption headings list the villages, and the table entries are A, B, C, or D as the case may be.

For the Class A villages, information is collected on how much is shipped and where. This is the principal interest of the survey.

#### Livestock

For data, representatives of the Ministry go to the livestock markets in each producing area. There are 1344 livestock markets, and all are covered for marketings and price. Some producers sell directly to slaughter houses, others sell through a market en route to the slaughter house. The staff investigates both channels. About 48,000 dealers bring livestock to the markets.

There is a big trade in feeder pigs. Farmers buy feeder pigs at about 90 days of age, fatten for 3 months, and sell. Producers of feeder pigs have bought registered sires and are improving the breed. Vaccination for cholera is universal.

There are about 50 markets handling over 10,000 feeder pigs per year. The number of feeder pigs sold to fatteners is given as 6 million of which 1.2 million go through these markets and 4.8 million go from farmer-breeder to farmer-feeder. The feeder pigs are sold at auction, and average ¥4,000 to ¥7,000 per pig.

Prices are published by the auction market as a requirement of law. The Ministry staff collects these published prices every 10 days.

The beef cattle industry is not highly developed as a specialized industry, although some efforts are being made in this direction. Cattle are bred in the mountainous areas. The farmer in the flatland buys them, feeds to about 18 months, and sells to the fattener. They may also be used for breeding or as draft animals. There is little tendency to specialize as to breeds common in America, but some attention is given to what is described as Wagyu or "Japanese cow." Milk cows tend toward the Holstein, especially in Hokkaido.

Before the war, the number of draft animals was about 3.3 million; now it is around 2.2 million. About 600,000 beef-draft type animals are slaughtered each year, and about 130,000 milk cows. The 2 categories comprise the total beef production.

There are 830 slaughter houses in Japan, 18 of which are classed as meat markets--that is, wholesale markets of meat. By law, no animals may be slaughtered for food except in a slaughter house where a veterinarian inspects every animal before slaughter.

The 18 meat markets are in big cities, and operate in conjunction with the slaughter houses. In effect, they comprise the wholesale market for meat. Eighty of the 830 slaughter houses annually butcher at least 30,000 head of livestock each; the others, less.

Ten of the 18 meat markets are surveyed for quantity and price every day by a staff member. The results are telexed to Tokyo daily and broadcast. This in effect sets the market price throughout the country.

An additional 70, or 80 slaughter houses in all, are surveyed daily for number of animals slaughtered. From the total for the 80, taking into account historical relationship, total daily slaughter is estimated. The remaining 750 are surveyed once a month for number slaughtered.

The government requires the daily estimate of slaughter to determine whether the supply is deficient, requiring importing. On the other hand, if the price drops unduly, the government buys to support the price.

Each year a consulting board, together with the Ministry, sets upper and lower limits as price policy guides.

#### Eggs and Broilers

An important item in the Japanese diet, eggs are marketed mainly through cooperatives. These collect and pack the eggs and send them to about 500 wholesale markets. A Ministry staff representative in 14 of these markets surveys every day the number sold and price. Data are telexed to Tokyo and broadcast for all markets. The other markets report once a month on total sales. Housewives apparently appreciate the daily price reports.

Per capita egg consumption in Japan is about 128, the average cost of production is about ¥4, of which half represents cost of feed--mostly milo--imported from the U. S.

There are 819 broiler plants, 101 of which handle over 200,000 birds per year. About 80 million broilers go to market annually, of which 50 million go to the 101 plants. From these 101 plants the staff of the local Statistical Office of the Ministry gets a report every 10 days on number handled (about 60 percent of the total production), and market to which shipped. The staff obtains price data daily from company books at 7 markets which receive large numbers of broilers. Prices are set by negotiation and there is no auction.

### Price Survey

Prices of fruits and vegetables are surveyed at the wholesale, middleman, and retail level. In the 11 big markets all items are priced every day.

Currently, only cabbage and onion prices are government supported but this might be extended to some other vegetables.

Meat is priced every day, as the impact of too high or too low prices requires either imports or purchase of surplus, respectively.

If egg prices get too low, the government asks dealers to stockpile. The government subsidizes this operation by taking the loss, if any, and paying interest.

For broilers there is no formal program, but imports must be restricted if the price gets too low.

### Marketing Cost Survey

Much the same system is used for all items, and on a sampling basis. The items covered are grade specifications; cost of packaging, transport, and commissions; wholesale cost; middleman (jobber) cost; retail cost.

### Grade Specifications

This is of interest because of the great variation. The government wishes to promote uniform packaging, and hence must specify size and standards.

### Cost of Packaging, Transportation, and Commission

These subjects are studied by commodities or commodity groups. For example, oranges are machine sorted. To get data on sorting costs, packing plants are classified by type of operation and sampled at a rate of 1 in 20.

For data in large wholesale markets, all handlers are queried, but in smaller markets, only the largest. Market regulation is quite strict. Currently, wholesale auctions and middlemen charge 8 percent commissions. The Ministry staff gets from the books of the dealer the net to producer and the dealer's operating expenses. This information is used as a basis for recommending the allowable commission.

Middlemen buy from wholesalers and sell to retailers. There are around 2,500 middlemen handling fruits and vegetables and these are sampled at a rate of 1 in 20 to get data on their cost of doing business.

Retailers number about 150,000, and are sampled at the rate of 1 in 500 for a sample of 300 distributed over the nation. There is a list of retail stores which is used for this purpose. The staff surveys the sample, gets the price of each kind of fruit and vegetable handled and the cost of doing business, and attempts to allocate costs by item. Particular difficulty is encountered in allocating rent, especially when the rent covers the operator's residence as well as his place of business. Some difficulty is encountered in getting cooperation, but the dealers' association gives its support, and cooperation is said to be "reasonable" although the refusal rate runs about 20 to 30 percent. Most retail dealers buy produce valued at around ¥100,000 to ¥150,000 per day.



## Marketing Loss

The last type of agricultural marketing survey is one relating to marketing loss. For fruits and vegetables the weight at the packing shed is recorded, then the weight in the market on arrival, and finally the weight of the residual food product at the retail market. Sixty Tokyo stores were originally selected for this study, but it has been conducted in only 12 so far.

Incidentally, Japanese custom at the farm level is to add one additional fruit or vegetable to the package over and above the specified weight.

For meat, the object is to determine the proportion of live weight that arrives as meat at the retail level. This survey is new and not yet "stabilized." It begins, however, with a weighing in of 30 head of animals by a staff member at the slaughter house in 10 markets. Then each carcass is weighed on a fresh basis and later on a cooled basis. It is weighed the last time at a butcher shop to check on the "bone-out" weight.

## Consumer Preference Studies

A survey of consumer's preferences is conducted by interviewing dealers. In Tokyo, 120 stores selected on a random basis have been surveyed, using students of home economics in women's colleges as interviewers. This survey is for the guidance of farmers and is to be extended to other cities. Other questions relate to variety of tomatoes or cucumbers preferred by housewives, and to learning what the housewife prefers when cucumbers are not available.

It is hoped that information from this survey can help the Experiment Stations supply the right kind of seed to farmers. Incidentally, there has been considerable import of hybrid tomato seed from the United States.

There is a survey of annual consumption of commodities made by the Statistical Section of the Prime Minister's Office.

## MACHINE TABULATION

The Ministry of Agriculture and Forestry is well launched on a program of electronic data processing of reports. Use of punch-card equipment began in 1941, with electric accounting machines in the Statistical Section of the Secretariat of the Ministry. In 1950 the unit was transferred to the Statistics and Survey Division. One of the first jobs there was the 1950 Fishery Census; another was the sample survey in the 1950 Census of Agriculture. The workload gradually increased and many jobs are now handled on a routine basis.

In 1964 an electronic data processing machine, the HITAC 3010, made by the Hitachi Company (said to be the largest in Japan) from an American design, was installed. The HITAC 3010 is a 2-address central processing unit with memory of 140,000 cores comprising 20,000 characters, and access time of 7 microseconds. The machine uses fixed word length of 10 characters. Peripheral equipment includes paper tape perforators and verifiers, paper tape reader, card punches and card readers, 6 magnetic tape units, 6 telexes in the Marketing Survey Office connecting to 50 units in the Prefectural statistical offices, and an on-line printer with 1,000 lines per minute, English output, maximum capacity. The paper tape reader has a maximum capacity of 1,000 characters per second, and an average capacity of around 500 per second. The machine accepts and prints alpha-numeric decimal code, but internally is binary.

The magnetic tape is 7 channel odd-parity, with the 4 low-digit channels used for data, the next 2 for zone-bits, and the last channel for the parity check. The whole system costs ¥40 million annual rental.

The telex machines are used daily by the Marketing Survey office (for what is the equivalent of Market News Reports in the United States) as well as by other offices. The telex machines are used for data transmission but not for computer input, as the transmission channels are not sufficiently precise.

The HITAC 3010 now handles something like 10 to 20 percent of the computing load, but it is anticipated that perhaps 60 to 70 percent can be handled when a second machine is installed--hopefully in 1967.

The machine was used 392 hours in May 1965 against a standard usage of 200 hours, representing substantial overtime. For the period June 1964-April 1965 it was used 1,900 hours. There is no current provision for multiple shift operation for government workers, consequently the expansion is envisioned as more machines rather than more intensive usage of existing equipment.

Down-time is reported as 6 hours per week, plus 6 hours Saturday afternoon.

The rural price survey is punched on paper tape at the Prefectural offices and mailed to Tokyo, since Telex input transmission facilities are not available in the Prefectural offices.

About 100 employees in the several sections of the Division have been trained by the NBC (Nihon Business Consultant), but only a few are doing actual programming. Staff members of the machine unit consider it good policy to have subject matter people familiar with the machine system as an aid to schedule design, systems development, and general liaison. Doubtless some inter-unit shifts of personnel will be made from time to time.

For the livestock and sericulture sections of the Annual Sample survey the original questionnaires relating to each farmer were punched in the Tokyo office. This required 3 to 4 cards for each questionnaire. There were about 25 card punchers who averaged about 700 cards per day. Accuracy was reported as about 97 percent.

Cards were verified during the first half of 1964, but during the latter half machine programs for checking errors were adopted so that individual card verification is no longer practiced. It is the opinion of the data processing staff that greater speed and satisfactory accuracy are achieved by the present procedure.

For programming, actual machine language is often used for short programs--50 to 100 steps--but other systems are used as the memory assignment problem becomes more complex.

An "Assembly System" is used for most programming. It is simpler than machine language, and while the instructions are in one-to-one correspondence with machine operations, the machine does part of the addressing. For each instruction, there is a Tag, an Operation Symbol, space for supplementary instructions, and 2 address fields. .

COBOL is used only slightly. The big drawback is said to be compilation time--averaging one hour per program. Although the COBOL instructions are in English, this does not present a serious problem as most high school graduates have a sufficient command of English. The average COBOL instruction equals about  $3\frac{1}{2}$  machine instructions. The strong advantage of COBOL is stated as being realized in writing print-out instructions. Address modification is much less convenient, however, than for the Assembly system.



FORTTRAN has been used for programming analytical calculations and will doubtless be used for other jobs to which it is adapted.

Some punching is done on a contract basis at around 12 yen per card, which is roughly equivalent to 3 to 4 cents in U.S. terms.

Discussion of machine problems with representatives of the Ministry disclosed an amazing similarity to the problems existing in the U.S. Statistical Reporting Service.

## THE QUINQUENNIAL CENSUS AND ANNUAL SAMPLE SURVEYS

### The Quinquennial Census

The Agriculture and Forestry Section is responsible for the Ministry's part in the Quinquennial Census of Agriculture and for the conduct of the Annual Sample Census.

Pursuant to the recommendation of the U.N. Food and Agriculture Organization Japan conducted a complete Census of Agriculture in 1960, plans another in 1970, and will conduct regular censuses at 10-year intervals. A census with a shorter schedule was underway in 1965, probably to be repeated at 10-year intervals. The 1960 Census of Agriculture was conducted in cooperation with the Census of Population the same year. The Population Census is conducted by the Bureau of Statistics of the Prime Minister's Office, which "entrusts" the work in the Prefectures to the Prefectural governments through their representatives in each village, with, however, detailed instructions as to procedures. These representatives make a complete listing of each household in the village, with the required data relating to each, including identification of each household that farms. A copy of the village listings is made available to the Ministry of Agriculture and Forestry Prefectural Statistical office. That office then interviews all the farm households in each village. The 1960 listings provided a point of departure for the 1965 Census. Field work began about February 1 for the 1965 Census, and it was anticipated that it would be completed by the end of August with publication of summary results by around September 30.

A village may contain perhaps 10,000 persons, although many are smaller. A subdivision or block, of which there are about 150,000 altogether, contains 30 to 50 households and is the enumeration unit or enumeration district. As a check on the accuracy of the block listing, the village office selects 1 in 200 for making a completion check. Whatever under-enumeration is found is noted in the Prefecture report, but no corrections or adjustments appear to be made in the block, village, or Prefecture totals as a result.

The questionnaire for the complete agricultural census covers 4 pages. The first is devoted exclusively to cataloging the farm operator and all members of his household (family or other), describing them as to age and sex, kind of work in which they engage either on or off the farm and where they were employed if off the farm; and ascertaining whether any left the household during the year. The second page is devoted to a detailed description of land by utilization and tenure, changes during the year, and products of forest or wooded land, including both sales and home consumption. Page 3 inventories livestock and machinery and inquires about type of power used for various farm operations, number and hiring arrangements for farm labor during the year and the quantity of various fertilizers used on rice, "special crops," and "other crops" during the year. Page 4 makes detailed inquiry concerning sale of crops, livestock, and livestock products during the year.



The universe to be covered by the Quinquennial Census follows the definition prescribed by the FAO, which is essentially the concept followed in the United States<sup>5/</sup>. More particularly for the 1960 Census in Western Japan, it referred to households cultivating 0.5 tan (495 square meters; .12 acre) or more of arable land, and in eastern Japan to those cultivating 1.0 tan (991 square meters; 1/4 acre) or more. In addition, it refers to households cultivating less land if they show sale of agricultural products of ¥20,000 (\$55.56) or more. Certain small islands and inaccessible areas, such as those remote in the mountains, are not included.

In addition to the primary questionnaire, there is a supplementary questionnaire which covers special activities, poultry, tractors, etc., and participation in various types of cooperative activities and associations. It provides an excellent summary of the structure of the farm economy, and is the basis for extensive cross tabulations.

The census also provides the basis for constructing sampling frames for various types of surveys. A special listing of the farm households in each enumeration district is prepared, and also a card summary for the district. These provide an excellent sampling frame for the Sample Census and for any other sample studies that may be undertaken.

As a followup to the listing of membership in cooperative associations, the staff of the Ministry makes contact with the associations and secures extensive information concerning the activities of the membership. Consequently, a very complete picture of the farm economy is available, with the details available at the prefecture and sub-prefecture levels, where they are used constructively for sampling as well as other purposes.

#### Sample Survey--Basic and Quarterly

The Quinquennial Census of Agriculture provides the most complete total picture of Japanese agriculture available. However, much more detailed and frequent information concerning various aspects is provided by a number of additional surveys.

Two of the most important of these are the Basic Survey and the Quarterly Survey conducted under the supervision of the Agriculture and Forestry Section of the Statistics and Survey Division. These are both sample surveys and are closely related to each other. The former is conducted as of December 1 each year, and the latter as of December 1, February 1, May 1, and August 1. The time allowed for reporting to the Ministry by the Prefectural offices ranges from 3 to 7 weeks, depending on the report. A report to the public by the Ministry is usually issued about 2 months after the survey date.

The sample for the Basic Survey consists of about 175,000 farms plus a special sample for livestock of over 40,000 farms. The 175,000 consist of 2 equal parallel samples, which, as of any given December, may be identified as an A and a B sample. The B sample is a newly drawn sample and will be used on the Quarterly Survey during the year and for the following December. The A sample will have been used during the previous year and will be dropped after the December Survey. For the following December, the B sample will be used with a newly drawn C sample, which will be used during the second year for the Quarterly Survey, with the B sample being dropped after December and so on for 5 years, when a new Census would be available from which to draw a new sample.

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<sup>5/</sup> In the preparation of this whole section on the Census and Annual Sample Census the author has drawn very substantially upon a paper prepared by Mr. Naomichi Gotoh of the Ministry of Agriculture and Forestry for presentation at a series of meetings held August 30 - September 11, 1965.

From the standpoint of subject matter coverage, the Basic Survey on December 1 includes about 150 items, centering around the following:

1. The number of farm households and changes from previous year; amount and changes in arable land by tenure; number and change in farm family by age, sex, and employment status.
2. Inventory of farm machinery and livestock and changes during the year.
3. Acreage and change in acreage in specific crops; number and identity of households owning various classes of livestock, and engaging in sericulture, by acreage of arable land.
4. Number of hired laborers by type of employment.
5. Number of farm households having certain types of electrical appliances.

The Quarterly Survey for December is directed towards planted acreage of crops and number of livestock by age classes. The purpose is to provide the basis for forecasting crops, hog supply, and egg production. Actually the same questions are asked of all 87,500 respondents, but certain differences in the type of comparisons to be made stem from the rotation (both annual and quarterly) features of the sample.

The Quarterly Survey is used largely by the livestock section in making various forecasts during the year. The crop planting information as of December 1 is used by the Crop Section in conjunction with yield information collected on a different sample on a different time schedule.

The Annual Sample (Basic Survey) provides basic data in 4 general fields, namely sericulture, farm household, livestock, and crop acreage, which are published in several volumes of reports.

#### Sample Design

It will be recalled that a complete listing of all the farms in each census enumeration district was prepared, together with a card for each E.D. giving critical data. These provide the sampling frame. Except for the islands and remote mountainous areas (and whatever degree of under-enumeration exists) the frame is virtually complete.

The general pattern is to stratify the total agricultural area by a 2-way classification; that is, each E.D. is classified and identified as to the "agricultural district" and the "economic" zone in which it lies. There are 3 major "agricultural districts" per Prefecture on the average that may be roughly delineated by type of farming. There are 4 major "economic" zones, namely, suburban, flatland village, agrimountainous village, and remote rural (or mountainous village) zone. In at least some Prefectures, additional substrata are identified. Thus, each E.D. is identified by its place in this classification pattern. These combined strata comprise the units of sampling stratification and are the smallest units for which estimates are made.

All the E.D.'s in each stratum are listed in order by size of livestock holding (cattle and hogs) or, for those with no livestock, by average arable land per household. The purpose of this arrangement is to increase the likelihood of including livestock in the sample. Since chickens are so widely owned, it is not deemed necessary to list by number of chickens owned.

The primary sampling unit is the E.D.; the secondary unit is the farm household. The sampling rate for psu's averages about 1 in 8.

There are an average of 30 farm households in an Enumeration District. Within E.D.'s, names are listed in order by area of arable land of each farm household, and again a sample of about 7 farm households is selected by systematic sampling with a random start. A supplemental sample of 4,000 districts (40,000 farm households) is selected in the areas with most livestock, and a third sample is selected for farms with over 10 milk cows or 30 hogs. Again, systematic sampling with random start is used, with a sampling rate of 1 in 5.

#### Other Characteristics

This sample is interviewed by a staff member, sometimes as many as 10 times per year. Since this tends to be annoying to the respondent, refusals are not uncommon. In order to minimize the problem, the sample is shifted each year by the A-B arrangement mentioned earlier, the 2 samples being described as "interpenetrating."

The number of farm households is regarded as a very important statistic. In Japan the number of households for a given year is estimated by the following formula:

Number of farm households for the given year = number of farm households  
previous year + newly established during year - disappeared during year.

The number of newly established or disappeared farm households is estimated by expanding the sample to the population level according to the sample design.

For most other items on the Quarterly Survey, the current estimate is a ratio estimate from the December 1 Basic Survey.

The precision for the 1962 Survey is given as:

|                                                        | <u>Prefecture</u>            |                           |                          | <u>Stratum<br/>(Estimation unit)</u> |                         |                          |
|--------------------------------------------------------|------------------------------|---------------------------|--------------------------|--------------------------------------|-------------------------|--------------------------|
| Total number of<br>farm households                     | 0.2 - 0.3%                   |                           |                          | 0.4 - 0.5%                           |                         |                          |
| Newly established<br>farm households                   | 20 - 30%                     |                           |                          | 30 - 40%                             |                         |                          |
| Number of cows                                         | about 10%                    |                           |                          | about 10-20%                         |                         |                          |
| Number of pigs                                         | about 20%                    |                           |                          | about 20-30%                         |                         |                          |
| Number of hens                                         | about 10%                    |                           |                          | about 20%                            |                         |                          |
|                                                        | <u>Less than<br/>3 ares*</u> | <u>100 - 150<br/>ares</u> | <u>Over<br/>200 ares</u> | <u>Less than<br/>3 ares</u>          | <u>100-150<br/>ares</u> | <u>Over<br/>200 ares</u> |
| Number of farm<br>households by size<br>of arable land | 4 - 5%                       | 4 - 5%                    | 10 - 20%                 | ---                                  | 5 - 7%                  | ---                      |

\*One are equals 119.60 square yards.



The survey is a multi-item survey, and accordingly is intended to be self-weighting. Each sample--A, B, and additional--is expanded separately and the totals then combined.

It will be noted that not only does the December 1 survey give a direct estimate of the items enumerated; it also gives a ratio estimate since for any given year relative to the previous year, one-half the total sample is common to both years.

Since the data are tabulated by size groups, for all or at least many items surveyed, a matrix is set up by which a current/last-year estimate can be made.



|                   | Previous year |  |  |  | Frequency by size |  |  |  |
|-------------------|---------------|--|--|--|-------------------|--|--|--|
| Current year      |               |  |  |  |                   |  |  |  |
| Frequency by size |               |  |  |  |                   |  |  |  |
|                   |               |  |  |  |                   |  |  |  |
|                   |               |  |  |  |                   |  |  |  |
|                   |               |  |  |  |                   |  |  |  |
|                   |               |  |  |  |                   |  |  |  |

The Basic Survey in December--to repeat--covers nearly everything: number of farm family households, machinery, livestock, and so on. For December, the questions regarded as part of the Quarterly Survey ask information on acres planted or expected to be planted; also the number of hogs, beef cattle, and poultry by fairly detailed age classes. They provide part of the materials for the crop and livestock forecasts.

On the February survey, attention centers on crops planted and on livestock.

On May 1 the survey deals wholly with livestock.

In August, attention centers on crop planting and on livestock, including milk cows. For crops, it provides the basis for forecasting winter plantings and summer harvesting.

Considering the livestock in more detail, the December Basic Survey is used to forecast pork production, and to estimate actual production of eggs by months.

The December survey, among other things, queries number of animals, number of farms keeping animals, condition of farms, who cares for the animals, number of farm families, kind of feed and fodder used. (Much of the feed is bought from the United States).

The surveys used for forecasting milk are February 1 and August 1. These surveys ask for number of cows bred by months, number that calve and come fresh by months, thus giving a running total of number of cows in milk.

Data on production per cow come from 3 sources. The principal one consists of the total milk received by processing plants divided by the number of cows in milk. A second is provided by production for sample farmers as indicated by milk plant records divided by the number of cows for these farmers. A third is a record kept for about 2 years by a group of farmers on daily milk production and number of cows. This record appears to have been discontinued but provides a reference figure.

Since the survey gives an indication of number of milk cows 2 years of age and over, and the number added from maturing calves, a projection of probable milk cow population nearly 2 years in the future can be made. A time series analysis is used to some extent as a check on other procedures. This method relates residuals from seasonally adjusted milk production and total animals slaughtered. This relation, lagged one year, is used to adjust current milk production.

For hogs, the estimating procedure is generally similar to that used for cattle; namely, proceeding from analyzing and projecting repeated surveys of number by detailed age groups. Thus, the Quarterly Surveys give numbers by age (1-month intervals up to one year) and number slaughtered by age groups (5 months and over).

The Basic Survey for 1963 indicated that of 5,810,849 farmers in Japan (excluding Hokkaido), about 700,000 kept hogs. Half of this number kept one or two; less than 100,000 kept three or four; and less than a thousand kept as many as 100.

There is a monthly record since 1958, from the Quarterly Surveys, of the number of hogs 5 months of age and over that have been slaughtered. The ratio of the number slaughtered to the historical inventory provides a basis for a short-term forecast from the projection of the current inventory by age.

A longer-term forecast is afforded by the Quarterly Survey data on number of sows bred and the percentage farrowing. The previous year's record related to the current projections provides a basis of estimating slaughter about 9 months in advance.

The only poultry item that is forecast is egg production. It may be noted that there are about 1500 hatcheries in Japan, many of which use various of the leading strains of eggs imported from the United States. Nearly 50 percent of the poultry producers are using U. S. strains because of their higher production.

For information on hatchery production, a sample of 300 hatcheries is maintained. It includes all the hatcheries of over 100,000 capacity, and one-tenth of the remainder. This survey is conducted each month, and gets number of chicks shipped each month to poultry farmers. On February 1, for example, it gets the number hatched in January, and the number expected to be hatched in February. In January, March, and July a complete survey of all hatcheries, getting data by sex and by egg-broiler class, bench-marks the monthly survey.

Although there are some complaints by hatcheries regarding these inquiries, cooperation with which is voluntary, good cooperation on the whole is secured as the hatcheries desire the information for their own guidance.

From the Quarterly Survey (each quarter) the number of laying hens as of the survey date is reported, together with the number of eggs laid. From this the monthly production is computed by multiplying by the number of days in the month.

Also, as of each survey date, the number of chicks of various ages is recorded, and from this, projections for intervening months can be made, and these are tied to the hatching data. Thus, the survey might show the number of hens in the "May" line of the format below; the number in December would come from the previous survey.

| Month of Survey | Age (months) |       |       |       |        |        |         |         |
|-----------------|--------------|-------|-------|-------|--------|--------|---------|---------|
|                 | Under 1 mo.  | 1 - 2 | 2 - 3 | 3 - 4 | 5 - 6  | 6 - 12 | 13 - 15 | 19 - 24 |
| Dec.            | Chicks       |       |       |       |        |        |         |         |
| Feb.            |              |       |       |       |        |        |         |         |
| May             |              |       |       |       | Layers |        |         |         |

The chicks less than one month old in December will be in the 2-3 month group by February and in the 5-6 month group by May, and beginning to lay. From this pattern, an estimate can be made of the number in each of the intervening months. Also an adjustment for death loss can be made as follows:

$$\text{Feb. 1 number} - \text{Dec. (A+B)} \times \frac{\text{Feb. (B)}}{\text{Dec. (B)}}$$

A need for a better method of estimating death loss was expressed.

Using these data together with the monthly hatchery estimates provides an estimate of the number of layers expected several months in the future as of any time.

The milk producing industry in Japan resembles that in the United States in some respects. Milk is produced both for fresh use and for processing. All is sterilized, using the high temperature process rather than pasteurization. There are about 2,500 receiving stations and plants, of which 2,000 separate and cool milk, 400 are plants where sterilization takes place, and 100 are simply collecting stations. Data are collected every month from all the 400 sterilization plants, from 600 of the 2000 separating and cooling plants, and from all 100 collecting stations. Each month an "advance" (preliminary) report is issued, with an annual report at the end of the year.

The production of milk has been rising rapidly. For 1964, the total production of milk was reported as 3.04 million metric tons, of which 1.6 million tons were for fluid consumption, 1 million tons were for processing, and 2 million tons were consumed on farms either by calves or by members of the farm households. This amounts to only a fraction of a pint per day of milk and milk products per capita for the Japanese population; hence, much of the available milk is consumed by babies and children.

There are 270 plants for processing meat, horse meat included, which are surveyed once a year for tonnage by kind of product. The annual capacity of these plants is about 300 metric tons. There are also many smaller plants which are not surveyed as production is trivial. Per capita consumption of meat is about 7 pounds, including sausage.



## ECONOMIC SURVEYS

The Ministry conducts a number of surveys oriented in economic terms. The more important fall under the following headings:

1. Farm Household Economic Survey
2. Cost-of-Production Surveys
3. Farm Management Survey (characteristics of larger and more successful farms)
4. Prices Received and Paid by Farmers

A fifth survey, on Food Consumption and Family Welfare, is not yet activated. The FAO has recommended surveys of this type, and they are expected to be undertaken in 1966.

### Farm Household Economic Survey

The first of these economic surveys--the survey on the Farm Household Economy--has a history which dates back to about 1889, with interruption only from 1916 to 1920, and with, of course, numerous changes in methodology (2). In 1913 a bookkeeping basis somewhat resembling the current system was adopted, in 1949 a system of stratified random sampling was initiated to replace the former "purposive sampling," and in 1957 a "stratified 2-stage sampling with proportional probability" design was adopted.

The survey is looked on as providing basic data relating to agriculture and forestry policy, in particular data indicating both the trend and level of agrarian income. For the survey year, April 1 - March 31, the survey is addressed to (1) composition of the farm household, (2) assets and liabilities at beginning and end of the year, (3) receipts and expenditures, (4) labor inputs. Comparison of assets and liabilities at the beginning and end of year with the income disbursement record permits analysis on a "balanced account" basis.

The main results of surveys of this type are published in the Yearbook of the Ministry of Agriculture and Forestry (9). They are in some respects the counterpart of the data described earlier (page 4) derived from the survey conducted by the Bureau of Statistics of the Office of the Prime Minister. Since the farm households derive their income primarily from sale of farm products, much of the presentation is devoted to detailing the sale of products and the receipts therefrom, together with non-agricultural business or wage income, as well as expenditures for both living and production purposes. The survey also provides data on the "nutritional condition" of the farmer, including per capita supply of principal foods, by type of agricultural areas and income class. In 1959 the Farm Household Survey covered about 5800 households, but in 1962 and later years the number was increased to over 15,000.

The families who agree to keep the records are visited by representatives of the Ministry of Agriculture and Forestry Branch Offices, provided a book for the purpose, and given guidance in record keeping. The Ministry pays each cooperating family ¥3,600 per year (about \$10). Although the payment is small, the refusal rate is only about 1 percent.

### Sample Design

The sample for this survey consists of 15,200 farm family households allocated among Prefectures in proportion to the farm household population shown by the last census (1960). Within Prefectures, on the basis of the census, farm family households are grouped into about 60 sampling blocks, each of which contains a group of agricultural communities, which average about 200 farm households. A specified number

of groups of agricultural communities are selected by systematic sampling with random start. From each of the selected communities, 5 families are selected, also as a systematic sample with random start. In the sample frame for each block the families are arranged in order of size of holding. If the selected family refuses, the next or preceding is selected as an alternate. This survey is repeated each year, retaining as many of the original sample as possible, but replenishing up to the quota at the beginning of the next year. Perhaps 200 a year drop out. With a new census, a completely new sample would be drawn.

### Survey Operation

When the sample has been drawn, a member of the local staff of the MAF invites the families to a meeting. (Five families is regarded as a convenient number to handle at a meeting) The staff member explains the purpose of the survey, using the brochures supplied by the Ministry, and distributes the Farm Record Book.

The first page of this book consists of an illustrative page together with instructions. The book is supplied with carbon paper, so that an original (to be retained by the farmer) and a copy (to be collected by the staff) can be made.

The format of the page provides for meticulous detail in the record keeping. On each page (designed for keeping records for 3 individual days) Section 1 is for cash handled (in or out); Section 2 is for recording home consumption of products; Section 3 is for recording exchange of commodities for other commodities, for machine hire, etc. as "rice for clothing"; Section 4 is for recording installment payments; Section 5 provides for an extremely detailed record of time worked on or off the farm, and money received for such work; exchange work; work on a year round basis; work on a temporary basis; use of animals or machinery; the kind of power; use of fertilizer or spray and the amount, kind, and purpose with name and quantity--all this recorded day by day.

Some purchases and sales are made through cooperatives, and to complete or verify the record, the staff visits the cooperative office and reviews the cooperative books. The reason for this is that the farmer often does not know or recall details of cooperative transactions, as purchases of fertilizer may be offset against sale of produce.

The staff visits the farmers once a month, reviews records for completeness, tries to fill out incompleteness, and takes the office copy to the Branch Office.

In addition to the record described above, the staff representative prepares--by interview--an Asset Record as of April 1 of each year. This includes a very detailed record of the family structure and all the assets (land, buildings, livestock, machinery, savings, etc.). At the end of the year this is compared to the current monthly record and reviewed for discrepancies. An effort is made to reconcile any discrepancies.

The branch office prepares a summary of the month's record for the farmer, and incorporates each record into a summary form for the Prefecture office. These are identified in such a way that the Prefecture can summarize in various ways. One of the more important is by 4 general area categories cutting across the whole of Japanese agriculture, namely: (1) suburban areas, (2) plain or flat land, (3) mountainous and flat land mixed, (4) mountainous.

The Prefecture office prepares a coded summary, transmits the data tapes punched by telex to Tokyo by mail, and in Tokyo a machine summarization takes over and prepares a summary.



On an annual basis, results are summarized by agricultural region, by farm size, by type of farming, etc. A number of reports are published from these data, including "Annual Report on Quantity and Price of Agricultural Products and Resources," "Annual Report of the Survey of Nutrition of Farmers," "Report of Commercialization of Agricultural Products," and "Annual Report on Taxes and Other Public Impositions."

### Cost of Production Surveys

The results of cost-of-production surveys are published in considerable detail. For example, the 1959 Yearbook (6) presents detailed cost breakdowns of the inputs for numerous crops, with data by prefectures for the principal crops.

As rice is by all odds the most important crop, a description of the procedures for this commodity will suffice as perhaps representative but probably more elaborate and painstaking than the others. The fact that the cost records compiled in this survey are used by the administrative board in establishing the price of rice is an added reason for believing this survey to be unusually meticulous.

The sample for this survey consists of 5,700 farms shown by the census to have produced surplus rice (rice for sale). The sampling method is very similar to that for the Farm Household Economy Survey, except that it is a wholly different sample and is selected in terms of quantity of rice sold. Of the 5.7 million farms recorded in the 1960 Census, about 3.3 million reported rice sales.

Here again the farmers are invited to a meeting (5 in a group) for the purpose of enlisting them to participate in the program. As in the case of the Household Economy Survey, the staff member presents each participating farmer with a brochure, and record book and instructs him as to the desired procedures. He requests the farmers to keep their record books close to their doors and to make their entries when they return from work. Thereafter he visits each farmer about once in 3 weeks to monitor the record.

The record book calls for the most meticulous record imaginable from the first day of seeding until the crop is harvested, covering all items of labor, all items of cost or expense, all details of when (to the day) each operation in each field was performed, and by whom it was performed (which of the family members or hired labor).

After harvest the staff member takes the record (leaving a copy for the farmer) to the office where it is reviewed by the Chief and sent to the prefecture office. In the latter office a summary for the whole prefecture is prepared and forwarded to Tokyo.

Certainly the detail and intensity of this survey rival any corresponding survey in the United States.

### Farm Management Surveys

The farm management surveys are designed to analyze the bigger, more successful, and more specialized farms in an attempt to discover the key to their success. The results of the analyses are beginning to be used by extension specialists.

With this objective--namely discovering the successful management practices--the method of selection is to secure recommendations from the some 20,000 extension and home economics specialists concerning the more successful farmers in the various areas. In all cases these are full-time farming operations. Selection is made so as to include specialized rather than general farms. Accordingly, a farm selected as a



rice farm would derive at least 50 percent of its income from rice; an orange farm would derive 50 percent from oranges, and similarly for silkworm, apple, tea, and other specialized farms.

The sample comprises 250 farms, averaging about 5 in each Prefecture. Some dropouts occur during a year's operation and replacements are made at the beginning of the next year.

Since the records are so detailed, the problem of securing cooperation is described as something of a "headache." Even so, since the farmer gets the benefit of the Ministry's accounting analysis, with the farmer simply making the initial entries in the record, there is a very real advantage to the farmer in being selected for the sample. This operation is in some respect similar to, but considerably more intricate than, the accounting arrangement at the Michigan State University for cooperating farmers.

This program began in 1937. Farmers are paid ¥4,200 per year (nearly \$12) for their cooperation, and the dropout rate is about 5 percent a year. At the end of the year each cooperator receives a summary report and analysis as an incentive for further cooperation.

At the beginning, the staff representative interviews the farmer and presents him with a record book, a hand book or memorandum book, and an instruction book. The instruction book carries a diagram in the form of a "flow chart" which shows the relationship between the record book and other records and summaries involved in the whole undertaking. The staff visits and interviews from time to time, and takes the office copy of the record, leaving the farmer's copy in the record book.

As of March 1 the staff interviews the farmer and records a complete inventory of the farmer's assets.

From these office copies, the staff in the branch office prepares a series of summaries and analyses which, at the end of the year, eventuate in a report which is returned to the farmer.

Instruction books to the farmer and to the branch and Prefecture office outline the entire procedure.

The record book provides a page for each day's record, with carbon copy. Section (1) is for the cash record in and out; section (2) is for recording home consumption; (3) is for marketing; (4) for sales or purchases on credit; (5) is for recording hour by hour (on a 24-hour basis) any work done by any family member or any hired labor by enterprise; and (6) is for recording supplies bought for production purposes.

The branch office prepares a set of summary forms each month. One section concerns detailed use of commodities bought, date of purchase, etc.; another covers items bought for production and items for family use and sale; another relates to byproducts such as straw, chaff, etc. and how they were used; another provides a detailed analysis of use of machines and power (tractor or animal) - kind, where and how used.

An asset record is taken by the staff as of March 1. It is arranged in sections covering plan of farm and its location (with a sample map on inside of front cover), list of the family members available for labor, the acreage, total and planted, by crops, and other property. The latter is classified as to land, buildings, implements, fruit trees, animals, inventory of crops, cash on hand or in bank, and debts. At the end of the year the staff compares the asset record at beginning and end of year with the current information supplied each month and attempts to reconcile differences.

A separate book is used by the staff to prepare a personal record of the farmer, noting every conceivable fact that may affect his success - schooling, age at which he graduated, age at which he took over from his father, tendencies to innovate, etc.

Two other forms are used by the officer for a supplementary analysis relating to the allocation of machinery and fertilizer to the several enterprises. These are recapitulated in a summary designed to indicate which crops are most profitable.

Another summary and recapitulation shows the net gain or loss attributable to each crop, and the detailed elements of cost and profit or loss for each. There is a final recap of the group operation, and a final report for the farm. This last is the only record going back to the farmer. It shows the record of the particular farm compared to the group.

This whole complex of information flows into the branch office, to the Prefectural office, and after summarization, to the national office. The "Agricultural Industry Management Report" represents an annual summary of this work.

#### Prices Received and Paid by Farmers, Farm Wage Rates

Prices received by farmers for commodities sold, prices paid for commodities bought for family living and for production, and farm wage rates--including not only labor employed on farms, but also wages paid for work on farm forests, and skilled labor in villages (for example, carpenters)--are collected and published each month. Indexes of each category are computed and published monthly.

About 50 items sold by farmers are priced regularly. Another 26 commodities such as apples, oranges, and strawberries, are priced on special surveys. About 109 commodities bought for production purposes are priced, and about 155 bought for farm family living.

For farm wages, rates of payment are collected for good workers, and in terms of different contractual bases, such as without board, or with 3 meals furnished.

Prices are collected in 446 villages throughout the country, averaging 9 or 10 per Prefecture. Villages are selected, not on a random or probability basis, but as representing trade centers in important farm areas as indicated by production data from the census. Reporters in the town--usually only one for any commodity or commodity group--are selected primarily on the basis of 2 criteria: (a) those with the largest farm trade, (b) those with a reputation for integrity and reliability.

For farm wage rates usually inquiry is made (a) of a farmer who employs a fairly substantial number of workers or (b) of a cooperative active as a concentration point or engaging in packing in the locality. The interviewing staff members may verify quotations received from the reporter by talking to other farmers in the area or to the co-op if the co-op is not the primary source. Inquiry relates also to kind of work and hours worked, with data for male and female labor separately.

Prices are collected on the 15th of the month, are summarized by the staff in the branch office, and a report sent to the Prefecture office on the 20th. The Prefecture office summarizes the branch office reports and telexes the Prefectural summaries to Tokyo on the 5th of the following month. In Tokyo the data are summarized to national averages; the indexes are computed by the 20th of the month following collection and published at the month's end.

Each Prefecture publishes Prefecture prices--both prices received and prices paid.



The indexes are of the Laspeyres type, with 1960 as the base and weight period. Revision of weights and base period are contemplated at 5-year intervals. They are comparable in this respect to other standard industry indexes, as prescribed by the Office of Statistical Standards.

The prices paid by farmers are at the retail level; those for prices received are on a net to farmer basis; that is, after deductions for transportation to market, handling, etc. Examples of the data published are presented on pages 303-356 of the 1959 Yearbook.

### Labor Force Statistics

The object of this set of surveys is to identify and analyze the movement of the farm family into the city, into other business, or into other families (as by marriage) and vice versa.

Concern with these matters stems from the problem noted earlier, namely the loss of persons from the occupation of farming simultaneously with the increasing demand for food with a rising population, a larger proportion of which is living in the city than formerly.

From the Agricultural Census, the number of the farm population is known with reasonable accuracy. The sole purpose of these surveys is to analyze the nature and magnitude of change in and out of the farm family.

This survey is conducted monthly from the same sample and simultaneously with the Farm Household Economic Survey. It is derived from a specific set of questions on the survey. Further, the enumerator lives in the Enumeration District for which he reports. He receives ¥1,000 per year (about \$3) for his services. The same E.D. is continued year after year.

The enumerator's report goes to the Branch Office, which summarizes those in its area and passes the summary on to the Statistical office in each Prefecture, which in turn reports to the Ministry of Agriculture and Forestry. The report issued as a consequence relates to the national level, and none are issued by the Statistical office in the Prefectures.

Questions on the monthly report relate to:

1. Number born and died.
2. Social movement; for example, cases in which the boy marries, resulting in a wife moving into the household; or an adopted person entering, etc.
3. Loss of family member, by moving to city, going to school or hospital, or daughter marrying.
4. Return to the household of someone who had previously left.
5. Movement of the whole family in or out of the village.

Data published on pages 21-30 of the 1959 Statistical Yearbook of the Ministry of Agriculture and Forestry are from this survey.

Another related survey is directed on April 1 and August 1 to graduates from junior high school, intermediate high school, or university. Here the object is to determine how many will remain on the farm and how many will leave.

This provides an analysis along the following line:

Grammar school graduates:

Number dropping,



Number going to high school:

Number dropping,

Number going to college.

With the effective length of the working period for a generation at about 30 years, about 200,000 boys per year must remain on the farm if the current number of farm families--about 5.5 million--is to be maintained. In 1963, only 54,000 remained in farm households (2). This fact serves to emphasize the concern being felt about the movement of young people away from the farm.

## CROP STATISTICS SURVEYS

### Acreage

Estimates of crop acreage, yield, and production are the responsibility of the Crop Statistics Section. The Section makes use of the acreage statistics collected in the Quinquennial and Annual Censuses, and in the Basic and Quarterly Surveys that have already been partially described. Additional surveys are made, however, for estimating production.

These involve two sets of inquiries--one directed to crop acreage, another to yields. Production is estimated as the product of acreage and yield. The physical basis for crop acreage surveys rests on an amazingly complete land record. This record had its genesis in a cadastral survey as part of the Meiji Reformation. Each owner registered his land at the municipal office. The land covered by a single registration was known as a "hitsu," and comprised a contiguous piece of land under a single ownership. The hitsus covering cultivated land are mapped (1:600 or 1:1,200) and identified by number, type of land (paddy or upland) and area as determined by a cadastral survey. This cadastral record provides the basis for land titles and for taxation (10).

The area shown in the land cadaster averages smaller than the actual area, perhaps by about 7 percent for paddy land and 5 percent for upland. The difference between the registered and actual acreage is reported as owing in part to lack of original instructions as to whether the registered acreage should include only "honchi" (land actually available for planting in a given field), or both "honchi" and "keihan" (a narrow band between fields comprising a dyke in the case of paddy land and a foot-path in the case of upland). About 7 percent of the paddy land area is estimated as consisting of keihan (more in mountainous areas where fields are small and less in flat areas) and around 3 percent of the upland. The remainder of the discrepancy apparently results from inaccurate measuring devices and unknown causes.

The magnitude of the discrepancy has been determined by actual planetable survey of sample plots over a 10-year period covering perhaps 10 percent of the land area. Adjustment ratios have been developed for the various survey units.

The sampling frame for the acreage surveys has been developed from the cadastral record, and consists of a complete frame of "tan-i-kus" (plots of cultivated ground averaging 2 hectares or slightly less in area) covering all arable land in Japan (excepting some remote island and mountainous areas). There are about 3 million such tan-i-kus, covering perhaps 100 million individual fields. The sample for the acreage survey consists of about 50,000 tan-i-kus, or an average of about 1,000 per Prefecture.

The frame for each Prefecture is maintained within the Prefecture. The tan-i-kus are identified on maps with the standard cadastral area indicated on the record. They are classified by categories or strata--paddy, upland, and mixed, together with additional characteristics--with the number in each cell of a fairly elaborate cross classification indicated in the sampling frame. The variance of the tan-i-ku characteristics within each cell is computed--usually by a range method--and used in the sample design. This permits drawing a sample, stratified in whatever manner may be regarded as appropriate for a given purpose, by means of an optimum allocation formula.

The system now in use did not blossom full-blown immediately. It is the result of a developmental program beginning in 1947 with a pilot sample survey on a nationwide basis together with objective measurements relating to rice. There followed a period of development, intensive analysis, and research, together with modifications and improvements in the techniques and details of sample design (10).6/

In practice, the cross-classification may vary somewhat from Prefecture to Prefecture; but the basic principle is consistent. Thus, in Kyoto Prefecture, the major classification consists of paddy fields, upland only, and paddy-upland combined (mixed). The paddy classification is subdivided into 7 subclasses (plain, mountain, suburban, cooperative area, riverside close (right side), riverside close (left side), and other). The paddy-upland class is divided into 8 subclasses. Upland is divided into 3 subclasses. These are cross-classified into 10 "Management" zones. Each class is further subdivided or classified according to the branch office having responsibility for the particular area. The net result is a cross-classification with about  $18 \times 21 = 378$  cells.

The Kyoto Prefecture contains 37,739 tan-i-kus. Each plot is assigned to one of the cells in the  $18 \times 21$  cross-classification grid. This forms the sampling frame from which a sample of 606 of the tan-i-kus is selected, with allocation made to each stratum with a view to securing maximum precision in the estimates from the sample.

For the sample, the land use map for a stratum is generally updated in alternate years. This updating relates to physical characteristics only--roads, building, etc.

A detailed acreage survey is made in alternate years. In the off-year the branch office interviews the farmers to get a record of change in acreage from the previous year. In making the acreage survey the field man is furnished with a map identifying the sample tan-i-kus or segments and a listing sheet. Each line identifies a given tan-i-ku, and gives its cadastral area. Using the cadastral standard area as a guide, he enters his eye-estimate of the area in each crop in an appropriate column of the form. When he has completed the form for a given group of tan-i-kus the columns are totaled and expanded by a factor derived from the sample design.

Each branch office covers about 60 such tan-i-kus. The records are summed for number of fields and area in each crop. These are expanded to the total by factors derived from the sample design. A factor is applied to adjust from the cadastral to the actual area. This is done April 1 and August 1. If other crops are planted later, a supplementary report is made. This culminates in a "complete" crop record for each of the 50,000 sample segments twice in every alternate year. In vegetable areas, this is done also as of May 1 and October 1, making 4 times in each alternate year.

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6/ The reference cited presents an excellent discussion of the development of the area survey, including not only its history and physical setting, but also many technical details relating to sample design.



In summary, acreage of crops is estimated by using the ratio of the surveyed area to area shown in the land record, by strata. An adjustment based on direct measurement in sample fields is made to correct for the error in the cadastral acreage total.

The acreage surveys, combined with the yield surveys, provide comprehensive information on acreage, yield, and production for each crop, by Prefecture. For major crops, published tables show number of growers, by size of field and by Prefecture. For some of the major crops, the planted area by varieties and by Prefecture is presented. Other tables show utilization of paddy and upland fields in winter, and of upland fields in summer. Number of farm households growing principal crops according to purpose--for example, mainly for marketing, partly for marketing, mainly for forage--are shown by Prefecture. All told, the data provide a very comprehensive picture of the very intensive utilization of land that characterizes Japan.

Tsukibayashi (10) gives the accuracy of acreage estimates in 1957 for paddy rice as within 1 percent for most Prefectures (within  $\frac{1}{2}$  percent for half the Prefectures) and for Mugi (wheat and barley) as within 3 percent (within 2 percent for half the Prefectures).

Production estimates are the result of multiplying the acreage in crops by yield data, to be described below.

The Quarterly Survey carries questions in August (for winter crops) and in March (for summer crops) concerning intentions to plant. This is done by interview, and the data are used to project estimates of prospective plantings. It is stated that estimates run perhaps 5 percent below the actual plantings.

#### Yield 7/

Since farming in Japan covers many crops, the statistical surveys involved in estimating yields are complex and extensive. For example, rice estimates relate to paddy rice and to upland rice separately; wheat and barley estimates relate to 6 classes or varieties; potatoes 3 classes (monthly Irish potatoes for the spring and fall crops; and to sweet potatoes). Estimates are made for 6 categories of millets, 8 of beans, 42 vegetables, 14 fruits, 23 industrial crops, and 12 green manure crops; also for vegetable and grass seed.

Intensive surveys are made for the important crops; less intensive ones for minor crops.

#### Rice

Total cultivated land area approximates 6 million cho<sup>8/</sup> (14.7 million acres), of which paddy rice utilizes 3 million cho (7.35 million acres) and is by all odds the most important crop. Upland rice utilizes 140,000 cho (0.343 million acres), wheat and barley 1 million cho (2.245 million acres).

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7/ Credit for much of the methodology used in estimating crop yields is given by Ministry representatives to Floyd K. Reed (retired) of the Crop Reporting Service of the Bureau of Agricultural Economics (now in the Statistical Reporting Service), U.S. Department of Agriculture.

8/ 1 cho = 0.99174 hectares (2.45 acres)



Since rice is the most important crop, much of what follows relates specifically to it, but the pattern--with some omissions depending on the importance of the crop--is applicable generally.

Rice is seeded in March, April, and May in a seed bed; after 35-50 days it is 6-14 inches high, and is transplanted in May, June, and July. It heads out in August and September and is harvested from August-September to early November. The statistical assignment is to forecast the year's crop as early as practicable, to make adjustments as necessary, and to make a final estimate.

A summary of the surveys is given in the table on the next page, with explanatory comments thereafter (table 1).

The 9 surveys from seed-time to harvest are of 5 different types, sometimes more than one type being used simultaneously. In some respects, the May survey is most important, for it tells whether seeding is early or late, whether germination is progressing satisfactorily, or whether the season is off to a bad start. There are many types of seed bed, and the survey covers the different types and the different kinds of rice planted.

The June 10 survey relates to weather conditions affecting the crop, and the July 1 survey centers on the progress of transplanting and attendant circumstances.

These first 3 surveys involve the "round inspection," an experienced observer making a round of his area to examine personally the features critical to the crop. As of July 1, also, comes the first use of the subsample hitsu<sup>9/</sup> in forecasting. This involves counting number of hills and number of stalks for a substantial sample, selected as described later.

From August to September comes the typhoon season which can bring great damage. The July 20 survey is directed to surveying the growing conditions. The ideal weather is no typhoons and high temperatures.

The August 15 survey comes at the time the early varieties are headed out, so that the survey involves counting the number of heads in a stalk, the degree of tillering, and the number of grains per head in the areas that are headed out. Since planting is in a standard pattern, the number of grains per head gives a basis for expanding to a preliminary indication. The forecast is expressed in terms of percent of normal, considered as an extrapolation for the current year of a fitted trend line.

September brings another round survey, but October 1 brings a full fledged survey as a basis for the first formal production estimate. In the sample fields, and by definite objective methods of selection of fields and hills, counts are made of stalks per hill, number of grains per head, and whether they are well-filled or lean.

November 1 brings an interim report on the yield forecast, with an estimate of yield per 10 ares based on tsubo sampling.

At the harvest season comes a physical survey, carried out on selected sample plots or hitsus, with actual cutting and weighing of precise areas, such that average yield on 10 ares can be calculated, and this is used to estimate production. A final interview survey of farmers queries them concerning production of the 2 principal

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<sup>9/</sup> A small area designated for survey. See also page 30 for use of the term as a unit of land covered by a single registration of ownership.

Table 1.--Japanese crop statistics surveys

| Date              | Type of survey                                           | Items of survey                                                                                                                                      | Method of survey |                                     |                     |      |           |
|-------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------|---------------------|------|-----------|
|                   |                                                          |                                                                                                                                                      | Sample<br>hitsu  | Sub-sample<br>hitsu for<br>forecast | Round<br>inspection | Mail | Interview |
| As of May 15      | Growing condition<br>(Early harvesting<br>areas)         | Sowing; germination; growth<br>of seedlings and condition.                                                                                           |                  |                                     | 0                   |      |           |
| June 10           | Quick report on<br>growing condition                     | Growth of seedlings after<br>transplanting.                                                                                                          |                  |                                     | 0                   |      |           |
| July 1            | Growing condition                                        | Sowing; germination; growth<br>of seedlings; transplantings;<br>rooting; growth in early<br>stage; condition of cultiva-<br>tion; growing condition. |                  | 0                                   | 0                   |      |           |
| July 20           | Quick interim report<br>on growing condition             | Existence of abnormality in<br>growth in early stage; and<br>its degree, if any.                                                                     |                  |                                     | 0                   |      |           |
| August 15         | General growing con-<br>dition (preliminary<br>forecast) | Number of tillerings; growth;<br>heading situation, indicated<br>growth; condition of cultiva-<br>tion.                                              |                  |                                     | 0                   | 0    |           |
|                   |                                                          | Number of tillerings; number<br>of heads; average number of<br>grains per head; yield per<br>10 ares.                                                |                  | 0                                   |                     |      |           |
| September 10      | Quick interim report<br>on general growing<br>condition  | Growing condition; heading;<br>existence of abnormality in<br>grain maturing, and its<br>degree, if any.                                             |                  |                                     | 0                   |      |           |
| October 1         | Forecast                                                 | Growing condition; heading;<br>grain maturing, forecast on<br>yield per 10 ares; condition<br>of cultivation.                                        |                  |                                     | 0                   | 0    |           |
|                   |                                                          | Number of heads; average num-<br>ber of grains per head; aver-<br>age weight of un-dried grains<br>per head; yield per 10 ares.                      | 0                | 0                                   |                     |      |           |
| November 1        | Quick interim report<br>on yield forecast                | Yield per 10 ares estimated<br>on basis of Tsubo sampling.                                                                                           | 0                |                                     |                     |      |           |
| Harvest<br>season | Final estimate on<br>production                          | Growing condition and yield<br>per 10 ares for Prefecture,<br>districts, and areas.                                                                  | 0                |                                     | 0                   | 0    | 0         |
|                   |                                                          | Number of hills; number of<br>heads; weight of rough rice,<br>raw and cleaned; all sur-<br>veyed by District and area.                               | 0                |                                     |                     |      |           |

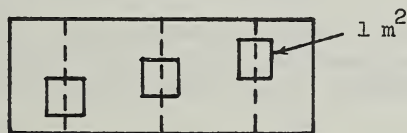
types of rice, (a) glutenous and (b) nonglutenous. The former is used by farmers locally for New Year and holiday celebrations. It is steamed and pounded to a fine paste. The nonglutenous is for everyday use and sale to the market generally.

The number of sample hitsus is determined so as to give a coefficient of variation for rice production of about 0.2 percent at the National level; 1.5 percent at the Prefectural level. They are allocated to districts, stratified by type of agriculture, and areas sub-stratified by productivity, taking into account the predicted planted area, importance, and complexity of the conditions of cultivation.

A productivity area is again stratified by estimated yield indicated by natural conditions and pattern of cultivation. Sampling of unit blocks is by probability sampling by cadastral area of each unit block.

From a sample unit-block, 2 hitsu are subsampled by a systematic random method.

In each sample hitsu, 3 square-meter plots are sampled, at specified positions so as to give the following effect:



For the August survey the staff representatives observe the farmers' harvesting operations in 17,000 segments (2 fields = 34,000 fields or hitsus in sample). The cut is measured and weighed from the 3 square-meter plots in one-fourth of the 34,000 fields. The hills are counted, the weight of raw rice per hill determined, and both are expanded for summing to the Prefecture level.

At the same time there is a count of number of heads in specified hills of the plots to measure the effect on yield of density of heads, and thus to gain insight into reasons for high or low yield.

After the raw rice is weighed it is taken to the office, dried, and re-weighed. Then 1/8 of the sample is dehulled and reweighed to get the weight of brown (dehulled) rice. If there is evidence of damage, a sample of 1/8 of the cut is taken from several fields; the weight of 1,000 kernels is determined as a percentage of the weight of 1,000 good kernels, in an effort to quantify the damage.

The weighings thus give the green weight of the sample and the dry weight. Then for a combined sample composed of a 1/8 fraction of several fields, the rice is dehulled and weighed. The good and poor kernels are determined by successive siftings which retain the best kernels at each sifting, eventuating in the poor kernels that have gone through all the sieves.

The mean weight for each stratum is computed, and this is expanded to the Prefectural level.

In the August Survey there is also a comparison with the previous year for one-quarter of the sample. These are the same fields that are later cut.

As a related activity, representatives of the Ministry are stationed at Experiment Stations in each Prefecture where there are experimental rice fields. The staff studies growth and increase in weight of plant from the day of transplanting. This provides a running check of growth. Progress of growth, flowering, pollination, and effect of temperature change are all carefully observed and reported. It has been



determined, for example, that if the temperature falls below 13°C (55.4°F) in the very-young, head-forming period, there will be no fruit later, even though flowering occurs, as this low temperature damages the fruiting body.

The mail survey is made 3 times a year to a sample of 70,000 with about a 50 per cent return and no followup. The purpose is to broaden the sample base.

#### Wheat and Barley

These, together with other crops, are in general handled similarly to rice, but the timing is that of the Quarterly Survey. A yield forecast is made May 15, a crop condition report as of April 1. March, April, and May Surveys report condition, and the last is used for yield.

#### Fruit and Vegetables

Growers of these crops have strong cooperatives, and most information concerning the crop production comes from them, together with inspection trips. These are checked or confirmed by observation of crop conditions in the field.

In summary, the estimates of the Ministry of Agriculture and Forestry relate to the National level and for Prefectures. Prefectures make such breakdowns for smaller areas as they may consider appropriate.

The main reports relating to production of crops are: (1) acreage and (2) yield--both based on sampling and measurement; and (3) damage--based on information on weather and physical condition, such as how many days the rice was completely under water, and the extent and duration of low temperature. Disease damage is largely a judgment estimate.

Forecasts of indicated yield are made usually twice before the final estimate--the first, 2 months or so in advance of harvest; the second, near the harvest date. Weather or other conditions can and do change the outlook as the year progresses. The accompanying tables afford comparisons of the preliminary and final estimates (table 2).

There is a counterpart of the Crop Reporting Board of the United States Department of Agriculture consisting of the directors of the 8 Regional Experiment Stations (or their representatives), together with the Professor of Agronomy in Tokyo University. This Board examines the statistical data emanating from the Ministry and issues a report 3 times a year.

#### SPECIAL SURVEYS

##### Tea

The production of tea involves about 1.3 million farmers, cultivating 48,700 hectares, and harvesting 342,000 metric tons of green tea, for which they receive ¥13.9 billion or about 1 percent of the total value of all products sold by farmers.

Table 2.--Japanese crop estimates: Forecast vs. final estimates, selected years 1/

| Crop and year | Apr. 1 forecast  | June 1 forecast  | Final estimates, dry wt. basis |
|---------------|------------------|------------------|--------------------------------|
|               | <u>Percent</u>   | <u>Percent</u>   | <u>Percent</u>                 |
| Beer barley:  |                  |                  |                                |
| 1961          | 100              | 106              | 113                            |
| 1962          | 103              | 113              | 106                            |
| 1963          | 94               | 73               | 56                             |
| 1964          | --               | 91               | 94                             |
| Naked barley: |                  |                  |                                |
| 1958          | 100              | 88               | 88                             |
| 1959          | 100              | 105              | 107                            |
| 1960          | 108              | 115              | 116                            |
| 1961          | 103              | 111              | 113                            |
| 1962          | 105              | 122              | 114                            |
| 1963          | 94               | 36               | 18                             |
| 1964          | --               | 76               | 76                             |
| Wheat:        |                  |                  |                                |
| 1958          | 90               | 90               | 100                            |
| 1959          | 101              | 106              | 110                            |
| 1960          | 106              | 112              | 117                            |
| 1961          | 102              | 114              | 123                            |
| 1962          | 105              | 116              | 106                            |
| 1963          | 96               | 67               | 49                             |
| 1964          | --               | 96               | 98                             |
| Barley:       |                  |                  |                                |
| 1958          | 89               | 92               | 100                            |
| 1959          | 102              | 105              | 108                            |
| 1960          | 104              | 109              | 108                            |
| 1961          | 101              | 106              | 112                            |
| 1962          | 103              | 112              | 106                            |
| 1963          | 96               | 88               | 74                             |
| 1964          | --               | 100              | 102                            |
|               | Aug. 15 forecast | Oct. 15 forecast | Final estimates, dry wt. basis |
|               | <u>Percent</u>   | <u>Percent</u>   | <u>Percent</u>                 |
| Rice:         |                  |                  |                                |
| 1955          | 112              | 119              | 118                            |
| 1956          | 111              | 104              | 104                            |
| 1957          | 107              | 106              | 107                            |
| 1958          | 112              | 110              | 108                            |
| 1959          | 106              | 108              | 109                            |
| 1960          | 109              | 108              | 108                            |
| 1961          | 107              | 103              | 102                            |
| 1962          | 102              | 105              | 105                            |
| 1963          | 101              | 102              | 101                            |
| 1964          | 105              | 101              | 99                             |

1/ All data in percentage of "normal" yield.

The tea producing area lies mainly from Saitama Prefecture (near Tokyo) and southward. Nearly 50 percent of the total production is in the Prefecture of Shizuoka. This, together with 13 other prefectures, produces most of the tea. There are 3 types of surveys:

1. Those conducted in Shizuoka at the 1st, 2nd, and 3rd picking.
2. Those conducted in 13 other important Prefectures at the 1st, 2nd, and 3rd picking.
3. Those conducted in the remaining 31 Prefectures--one survey at the end of the year.

### Shizuoka

The process of estimating production of tea involves first an estimate of area in tea, and second an estimate of yield. The estimate of area is derived as already described generally for crops. Maps prepared from the Acreage Survey in 1962 as part of the Sample Census, and from basic records, show about 60,000-70,000 plots of land of about 2 hectares each, individually identified as mostly paddy-field, mostly upland, or mixed paddy and upland. These are further described as improved land, mostly orange or tea, or land near cities where use is changing rapidly. The 60,000-70,000 plots and their respective places in this 3 x 3 grid, provided the sampling frame from which 1,200 plots (segments) were selected at an overall rate of about 1 in 60. The selection of the sample used a systematic design with random start in each cell.

The staff visits each of the 1,200 segments and using the Meiji maps, records the crop area in each segment on a listing sheet on which each plot is numbered and keyed to the map.

$Y_i$  = Area as recorded in the Meiji map.

$y$  = Meiji recorded total area of the 60,000-70,000 segments.

$X_{ij}$  = Area in the  $i^{\text{th}}$  segment devoted to the  $j^{\text{th}}$  crop.

Then  $\frac{\sum X_{ij}}{\sum Y_i} y$  = Estimated area for the  $j^{\text{th}}$  crop.

A coefficient of variation of 0.05 is stated for these estimates.

Inasmuch as the Meiji maps contained certain errors, adjustments are made based on measurements made for a number of years on sample plots. Measurement of sample plots was discontinued in 1961 owing to workload increase, but the correction factors developed thereby continue in use. During the years that these measurements were being made, a subsample of about 60 of the 1,200 sample plots was selected for planetable survey. From these there accumulated over the 10-year period the basis for computing a correction factor. Thus,

|                       |   |              |
|-----------------------|---|--------------|
| $Z$ = Measured area.  | } | Same fields. |
| $X$ = Meiji map area. |   |              |

Then  $\frac{\sum Z}{\sum X}$  = provides an adjustment factor for refining the initial estimate indicated above for land area in each crop.



A coefficient of variation of 3 percent is given for this ratio. The development of this adjustment factor resulted from the recommendation of Floyd Reed.

### Yield Estimates

There are about 20,000 hectares of tea in Shizuoka, 16,000 of which are in the main growing areas with 4,000 scattered in the mountains. The method of estimating yield differs for the 2 categories.

Main growing areas.-- These areas are plotted on maps, which show the tea growing areas lying along the valleys served by a "trunk" road with various branches. The total area is classified into 5 subareas, each of which is subdivided according to yield into high, medium, or low yield historically.

A total of 1,400 "route units" for survey are allocated among the above described areas, each route covering an area ranging from 3 to 20 hectares and averaging perhaps 12 hectares. The routes are allocated in proportion to acreage in the several categories, about 40 percent of which is in the more concentrated areas.

When the picking season starts (for the 1st picking this would be during the first of May) 2 survey days are selected at random.

On the day of the survey, the staff go to the selected "route units" and count the number of persons picking in each unit. The staff then selects 2 pickers and requests each to cut a 3-meter area on the tea bush immediately adjacent to the area where she had been picking, and on another 3-meter area. The pick from each area is weighed and recorded. The staff measures the distance center to center between rows, and computes a weight of green tea per square meter.

This is repeated for the other sample pickers, the results averaged, and multiplied by the area indicated from the acreage survey to get estimated production.

Scattered areas.-- In these areas, the staff selects a tea garden considered typical (same one each year to give year-to-year change) and asks the farmer to cut 2 plots of 3 square-meters each. Otherwise the procedure is similar to that already described.

The results of this field work are due in Tokyo on May 31, including an estimate by the Prefectural offices for incompleteness, as the season is not uniform in all areas, and some areas are not sufficiently along in harvesting to report.

The tea moves rapidly to the factories where it is converted to crude tea. There are 8,000 such factories in Shizuoka. In previous years 1,200 factories were surveyed by mail for yield of crude tea, but in 1965 the staff interviewed 130 to 160 (10-15 of the larger plants in each of the 13 branch offices of the Prefecture). The yield of crude tea ranges narrowly around 24-25 percent. The interview covers:

- (1) Total weight green leaf received by the plant.
- (2) Total weight of crude tea.
- (3) Percentage yield.
- (4) Weight of (a) ordinary green tea, (b) black tea, (c) gunpowder tea, (d) bunch tea (low grade).

The results are reported to Tokyo, together with a final report on green tea based on more complete returns than were available earlier. The report covers quantity of green tea, crude tea, and quantity by class of tea. Tokyo issues a report on July 15th for the first picking (July 20 in 1965 owing to late season).

Generally the 1st picking provides around 40 percent of the annual crop, about the same for the second, and about 10 percent each for the 3rd and also for the last or autumn picking.

### The 13 Prefectures

Each of these Prefectures is divided into 4 sections or strata, and 50 to 60 blocks (villages or part of a village) selected on a random basis in each Prefecture. From 3 to 5 farms are selected at random in each block, making around 150-180 farm households in each Prefecture. The local representative interviews each sample farm and gets acreage and production of tea. He also calls at tea processing plants for percentage of refined tea from the total raw products. These totals are expanded by the acreage in the prefecture.

### The 31 Remaining Prefectures

A representative of the Ministry of Agriculture and Forestry Prefectural Statistical Office goes to each village and gets from a representative of the village or the cooperative the production in each village. In some cases an estimate is secured from a tea buyer, and in some cases he simply makes a "guesstimate." These evidently are for the less important areas.

These reports for the several classes of prefectures are summarized for the total production.

Reports are forwarded to Tokyo as in the case of Shizuoka, although possibly in slightly less detail, as no other Prefecture even approaches Shizuoka in tea production. The nearest competitor, Kagoshima, on the far southern tip of Kyushu, produces only 2.7 million kilograms compared to Shizuoka's 47.9 million out of a total of 79.5 million (1959 data) for the whole of Japan.

### Oranges

Although providing less income to farmers in the aggregate than rice, oranges, like tea, are nevertheless an important product, primarily in Shizuoka. They are raised, for the most part, on hillsides that are not suitable for rice culture. The orange groves and tea gardens range far up the sides of rolling to steep slopes, often nearly to the tops of ridges, extending upward along the sides of narrow valleys. Occasionally, rows of tea are interplanted among orange trees.

The area in oranges is estimated in the same manner as that for tea, and is based primarily on the 1962 sample survey.

The system for estimating yield is under development, and so is not fixed in design. The present thinking and experimentation run along the lines described below.

As in the case of tea, a set of maps indicate the orange area by villages. Of the 13 branch offices in Shizuoka, 9 are involved in the survey of oranges.

Each office has 2 sample areas, and reports are prepared as of July 15, August 15, September 15, and at harvest, which ranges from October 1-30 for the early crop, to November 10-30 for the Canadian export crop, and to November 20-December 20 for the domestic late crop.

As of July 15, the blossom is finished and the fruit is beginning to form. From the size and number of the fruit, a preliminary indication is made, but no formal estimate of production.

By August 15 or September 15, the number of fruit is sufficiently definite to permit an estimate of production. The number and weight are determined at harvest time by counting and weighing.

The 2 sample plots for each branch office consist of perhaps 70-75 trees in one-tenth of a hectare (1 tan). For survey, the staff selects 5 trees--one some distance in from each corner of the plot, and one about the center.

About 20 fruits are selected from a typical branch on the tree (no directions as to precise method of selection) and each fruit is measured in 2 directions.

The total production of oranges in Shizuoka is about 240,000 metric tons (mostly Mandarin). Sixty tons are processed for canning and for juice.

The Shizuoka orange is sharp in flavor, consequently it is the practice to store them several months until the supply of southern oranges is exhausted.<sup>10/</sup>

The fruit stock is mostly Unchu (Chinese) grafted onto a native orange stock which is very hardy.

### Forestry

An indication of the importance of forestry in Japan is provided by the following figures:

|                             | <u>Cho</u> | <u>Acres</u> |
|-----------------------------|------------|--------------|
| National forests            |            |              |
| (formerly Imperial)         | 7,670,000  | 18,796,000   |
| Community-owned             | 2,970,000  | 7,278,000    |
| (village, prefecture, etc.) |            |              |
| Private forests             | 14,900,000 | 36,514,000   |
| Small holdings              | 11,320,000 | 27,741,000   |
| Corporation owned           | 780,000    | 1,911,000    |
| Shrines, temples, etc.      | 2,800,000  | 6,862,000    |
| Total forest land           | 25,600,000 | 62,735,000   |

### Million cubic meters

Estimated standing timber:

|                     |       |
|---------------------|-------|
| National forest     | 932   |
| Community forests   | 183   |
| Private forest land | 776   |
| Total               | 1,891 |

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<sup>10/</sup> The traveler on trains in Japan finds small plastic bags of whole frozen Mandarin oranges available from station platform vendors along with lunches, tea, milk, orange juice, beer, and sandwiches. The oranges are partially frozen, having been removed from frozen storage long enough to be nearly thawed and ready to eat at the time of sale.



The total number of farmers is a little under 6 million. Of these 2.66 million own some forest land, with 2.4 million owning less than 5 acres.

Of the 24.4 million cho (59.8 million acres) of standing timber, planted forests account for about 6.16 million cho (15.1 million acres), and natural forests for about 17.2 million cho (42.1 million acres).

From the standpoint of species, the more important are:

|                                                      | <u>Million<br/>cu. meters</u> |
|------------------------------------------------------|-------------------------------|
| Sugi (Japanese cedar or CYPTOMERIA JAPONICA)         | 317                           |
| Hinoki (cedar or white cypress-CHAMAECYPARIS OBTUSA) | 156                           |
| Red Pine (widely distributed)                        | 208                           |
| Beech (broadleaf BUNA FAGUSCRENATA)                  | 171                           |
| Larch (from Germany)                                 | 24                            |

Usage of timber (1963) is indicated roughly as follows:

|                        | <u>Million cu. meters</u> |
|------------------------|---------------------------|
| Timber demand          | 63.6                      |
| Domestic timber        | 50.2                      |
| Imported timber:       | 13.4                      |
| Philippine (Lauan)     | 7.5                       |
| U.S. - Alaska - Canada | 2.9                       |
| USSR                   | 1.8                       |
| Other                  | 1.1                       |

Although charcoal is widely used for heating, and historically has been the major means of heating and cooking, the use of LP gas is increasing rapidly.

Of the 6.16 million cho of planted forests, about 5.85 million cho are evergreen and only about 316,000 are broadleaf. Of the natural forests, however, 3,52 million cho are evergreen and 13.64 million are broadleaf.

Most of the market for hardwood is in the United States, but the large Japanese hardwood resources are nearly exhausted. Interestingly enough, about 10 percent of the pulp consumed in Japan is imported from Alaska and Siberia, although some timber farms are planting for this use, using stock originally from Italy.

The source of data on standing timber is largely from aerial photographs prepared according to methodology introduced by technicians of Purdue University during the Occupation. Data on production come mostly from lumber mills.

The principal types of mills are lumber, plywood, and preservation treatment (poles, etc.).

There are about 25,000 lumber mills. A sample of 2,500 mills are visited in alternate months by members of the MAF staff in the prefectures concerned. Data are collected for every month, however. At the end of the year, a member of the staff visits all 25,000 mills. Each Prefectural office has a list of mills in the Prefecture. The 2,500 sample includes all large mills and samples the small ones on a random basis, but the precise determination of the sample is left to the Prefectural office.

The inquiries to the mills are concerned with the quantity of timber received, by type; the quantity of lumber shipped out, by type; number of persons working; source of timber; species; type of equipment; and related subjects.

Plywood mills are surveyed every month with a mail questionnaire, but if the questionnaire is not returned, a member of the staff calls on the delinquent mill.

There are some 5,000 wood chip factories preparing chips for pressed wood--both hard and soft. These are surveyed by interview once a year.

There are also mills producing some hardboard and pulp. Data for these are secured from the Ministry of International Trade and Industry.

Each village is asked for a report on the amount of scaffolding used locally.

The tables on pages 395 to 462 of the 1959 Statistical Yearbook are derived largely from the surveys made by the Forestry Section. They relate to Forestry Management (area in public and private ownership, by type of forest cover), area and growing stock, forestation and cutting, forestry products, and lumbering, all by Prefecture.

#### Sericulture - Cocoon Production

Production of cocoons (silkworms) engages the efforts of nearly 10 percent of Japan's farm households. These 551,000 (1964) farm households produced 112,000 tons of raw cocoon for which they received ¥75 billion or about 3 percent of the total of Japanese farm receipts. They cultivated 164,000 cho (402,000 acres) of mulberry fields comprising a little under 3 percent of the total cultivated land in the country. However, the number of households engaged in sericulture and cocoon production is declining.

Production of cocoons is highly concentrated. The 3 Prefectures of Gumma, Nagano, and Saitama (near Tokyo) produce about half the total, and together with 4 others, all in central Honshu except Kumamoto in west central Kyūshū, produce three-quarters of the total for all of Japan. The crop is sufficiently important that the Extension Services of the Prefecture Governments maintain 6,000 graduate sericulture technicians (MAF pays part of their salaries), one for each of the 6,000 villages in which sericulture is important. These technicians not only provide assistance to farmers, but play an important part in the statistical operations relating to the industry.

In this setting the Ministry conducts surveys directed toward the following:

1. An estimate of production early in the season.
2. A final estimate of yield and production (at close of each crop).
3. Estimation of damage to cocoons and mulberry crop if such damage is claimed.
4. Estimate of production of eggs, incidental to the early season estimate of production.

The spring crop silkworm eats leaves for about 30 days, then starts to spin his cocoon. The summer crop silkworm eats about 25 days, and the fall crop silkworm, about 30.

#### Early Estimate of Production

The earliest indication of the year's production results from a survey around the beginning of the year in which a representative from the Prefectural Statistical Office of the Ministry of Agriculture and Forestry interviews the cocoon specialist on the staff of the hatchery cooperative in an average of about 50 villages in each Prefecture. The specialist checks on the number of eggs each farmer expects to buy. Expanded to the total for each prefecture, this provides an advance indication of egg purchase.

Since the orders go through the cooperative, and since all farmers belong, the cooperative is in a position to give a firm figure on total egg production about February of each year.

Each farmer places his order through the cooperative for the number of boxes of eggs he will require. Each box contains 20,000 silkworm eggs. Each Prefecture has available a historical record of the ratio of number of cocoons produced to the number of boxes of eggs, and thus can make in February an estimate of production based on the average ratio. A similar survey is made later for the summer.

At about the same time, each Prefectural office (in the important cocoon Prefectures) sends a mail questionnaire to a sample of farm households (one for spring crop and another for the summer-fall crop). This is a random sample, totaling about 8,000, with from 400 to 1,000 in each prefecture selected on a random basis. A return of about 64 percent is secured, and no followup is made.

#### Final Estimate of Production

The spring crop is usually finished by the end of June, and at this time a final survey of spring production is made. The representative of the MAF Prefectural Statistical Office interviews the farm households selected for this survey. For this purpose the specialist will ascertain from each farmer the amount of his production. A similar survey is made later for the summer-fall crop. In the 15 important producing Prefectures, surveys are made of about 8,000 farmers, with selection in each Prefecture on the basis of probability proportional to size, thus favoring representation of the larger operations. The selection is made through the cooperatives in the villages, which have records for each farmer.

In this survey, attention centers on the weight of cocoons sold, number of eggs, and percentage of Dupion cocoons (double).

They also weigh a sample of 50 cocoons to get total weight, and weigh again after removing the "flossy" part of the cocoon to get an estimate of weight on a clean basis. This ratio provides a means of adjusting the gross production to a net basis.

#### Egg Production

Production of silkworm eggs, as already noted, is a specialized operation. It is carried on primarily by rice farmers. In each prefecture there is an Egg Producers' Cooperative Association with branch offices in each district through which the eggs are delivered. The representative of the MAF Prefectural Statistical office gets information from the cooperatives on the hatch and cocoon production for egg purposes.



## Damage Estimates

When damage to mulberry production is claimed to an extent that may require MAF contribution, a representative of the Prefectural Statistical Office visits the field and the farmer to check on the extent of damage.

Similarly, if claims for damage are made in excess of 30 percent, the local representative inspects and reports on the damage.

The operating instructions and forms used are covered by the Guide Book (manual) and Forms Manual issued by the Ministry.

## FISHERY STATISTICS

Unlike the United States, in which the primary responsibility for statistics concerning fish and fisheries is vested in the Department of Interior, this responsibility in Japan rests with the Ministry of Agriculture and Forestry. This is partly because the fishery industry has not developed to such a point as to be administered by a separate Ministry. Even so, the fishery industry is well developed, and there are companies with large amounts of capital invested. It is perhaps also partly because of the close relationship between fish, upon which the Japanese people depend so heavily, and other food. It is also probably in part because the Ministry of Agriculture and Forestry is one of the few that have a statistical organization reaching to the local level. Even so, the Ministries of International Trade and Industry, Finance, Transportation, and Welfare all have interests in fish and fisheries, and some activities related thereto (1).

Although the Ministry of Agriculture and Forestry has a statistical organization extending to the local level, it nevertheless entrusts to the Prefectural governments the taking of the Quinquennial Fisheries Management Census and grants a subsidy to them for the purpose. The Fisheries Management Census was scheduled to be on a 5-year cycle, beginning with the 1948 fiscal year, but owing to fund limitations, the census of 1958 was on a limited basis. Accordingly, the 3rd full-scale census was that of 1963.

For intercensal years data are collected by interviewing the district representatives of cooperatives or other fishery organizations. These interviews are conducted by the field staff of the Division of Statistics and Surveys.

There are 4 major surveys as follows:

1. Intercensal Survey: A survey to Fisheries Cooperatives and for representatives of fishery towns, to determine how numbers of the following items increased, decreased, quit, became newly established, and so on:

a. The fishery enterprise (employs fishing vessels with aggregate tonnage of 10 gross tons and over) and the fisheries household (employs fishing vessels of less than 10 gross tons).

(Note: "Gross tons" means inner capacity of the hull excluding the capacity of the open construction on the deck. One gross ton is equivalent to 100 cubic feet.)

b. Type of fisheries, size of fisheries. (Usually classified by the aggregate gross tonnage of the enterprise.)

c. The members of fisheries households, recruitment to fisheries of the new school graduate in the family.

2. Catch Statistics: This covers sea fisheries, shallow sea aquiculture (such as oyster, Nori, pearl culture), inland water fishery, inland water aquiculture (such as paddy field fish culture, pond-culture of eel, carp, trout, etc.).

3. Economic survey of fishing enterprises and households of families whose primary income is from fishing. This is similar to, and complements but does not duplicate, the farm household survey, for the latter excludes families deriving their income primarily from fishing.

4. Distribution statistics at the major landing ports:

a. Landing statistics: Tuna and salmon are fairly uniform in the catch, but most other species must be sorted into baskets or portable boxes by size and quality for entry into the market. Sale is through auction, usually conducted by the fishermen's cooperatives at the landing ports. Accordingly, data on total landing by kind of species are available at these points.

b. Disposition statistics: Division of catch by purpose is accomplished at the landing port. Fish for fresh use are usually bought by middlemen who then resell them to retailers. Operators of storage facilities buy fish for storage, and also provide storage to others who need to hold fish pending shipment. Processors also enter the market at the ports and bid for their supplies.

c. Shipment statistics: The destination of fresh fish broken down by Prefecture areas, regions near big cities, and 9 other regions of the country. Data are further broken down by type of transportation facilities (railroad, railway express, truck).

d. Price at the landing ports: Price is derived from the quantity and value. Data on the quantity and value of fish going to these several uses or regions are compiled from the records of fishermen's cooperatives.

e. Processed fisheries products statistics: Compiled once a year by interview or associations' records for each survey district.

f. Distribution statistics at big cities: Receipts at wholesale market; division of receipts at wholesale, middlemen (broker), or retailer; prices at each level (wholesale, broker, and retailer).

g. Cold storage holdings: Covers 922 plants which have 400 tons per day capacity out of a total of 3,000 plants in the country.

In addition to the above statistics, gross earnings from fisheries are collected and analyzed. Production indexes are computed.

h. Other statistics: Some important statistics are compiled and published in the Fisheries Agency. The major ones are: fishing boat statistics; fishing boat insurance statistics; fisheries cooperatives statistics; and other business statistics on pelagic fisheries (such as whaling, salmon statistics compiled from the records of operation required from each fishing boat owner).

## Economic Survey

The economic survey considers fishery households in 2 categories: (1) those operating fishing boats of less than 10 gross tons, together with those who engage in shallow sea aquiculture or in fishing activities such as fishing with beach seine or set net, or shellfish gathering; (2) those who operate fishing boats 10 gross tons and over. The latter are referred to as fisheries enterprises.

Households in the first category are sampled at different rates, depending on size of boat or type of fishing activity as follows, to yield a total sample of about 1,000.

|                             | Number<br>(1963 Census) | Sampling<br>rate |
|-----------------------------|-------------------------|------------------|
| Nonpowered boat (row boat)  | 51,154                  | 1/700            |
| Power boat                  |                         |                  |
| Less than 3 tons            | 84,778                  | 1/200            |
| 3 - 5 tons                  | 14,216                  | 1/100            |
| 5 - 10 tons                 | 6,416                   | 1/50             |
| Aquiculture in shallow sea: |                         |                  |
| Pearl farms                 | 2,767                   | 1/100            |
| Nori                        |                         |                  |
| seaweed farms               | 51,354                  | 1/200            |
| Oyster farms                | 4,349                   | 1/70             |
| Small fixed net             | 5,999                   | 1/100            |

The sample is distributed among all Prefectures with seacoast (all but 8) giving consideration to the number of managements by tonnage strata in the Prefecture. Each Prefecture selects the sample households by purposive sampling, largely because of the exacting requirements of the diary. Many families continue year after year.

As for household surveys, a branch official distributes record books to the cooperating families. This provides, in duplicate, space in which to record each day the weight of fish caught and the weight sold, money received, cost of supplies (oil, etc.), receipts from other work and expenses connected therewith, expenses for the household's living, and all taxes--in short, a record of all money coming in by source, and all money paid out, by purpose. The branch official collects the record each month, prepares a summary each month and sums up at the end of the year. He sends the latter to the local office which forwards a copy to Tokyo. There it is put on the computer for summary and various cross-tabulations.

On January 1 and December 31 the same sample is surveyed for assets and liabilities--land, boats, nets, engines, simple processing facilities, fuel inventory, cash, savings, stocks and bonds, etc. This is analyzed and the branch office visits the family to reconcile differences between it and the daily record. One branch official is responsible for about 5 families.

Households in the second group--fisheries enterprises--are handled in much the same manner.



Operations involving boats of over 10 gross tons are sampled at different rates as follows:

| <u>Tons</u>     | <u>Sampling rate</u> |
|-----------------|----------------------|
| 10 - 30         | 1/30                 |
| 30 - 50         | 1/20                 |
| 50 - 100        | 1/15                 |
| 100 - 500       | 1/10                 |
| Over 500        | 1/5                  |
| Large fixed net | 1/20                 |

The samples include private and corporate operators. The private operations are handled similar to the small operations. The corporate operations keep books, so that the branch official simply depends on them, taking off information regarding receipts and expenses, number of employees, hours worked, wages paid, etc. once a year. No survey is made of the family living expenditures of such employees, since the survey is an industry survey and attention centers on income and expense for the industry, not on the participants as individuals or families.

The records are classified by kind of fishing operation. Often a given boat will be involved in a tuna operation during the first part of the year, and in a saury pike operation in the latter part.

Nori (a food product prepared from certain sea weeds) is one of the items farmed in aquiculture. Nitrogenous fertilizer is applied to promote growth. The Nori is picked out of the water on string nets, dried in the sun, or artificially dried, and pounded to a thin paper-like leaf. In addition to the domestic production, some Nori is imported from Korea to meet the large demand.

#### Distribution Survey

The principal steps in the distribution or marketing of fish involve the cooperatives at the landing ports (representing the fishermen) and the wholesalers and brokers at these wholesale markets; wholesalers and brokers at the consuming centers; retailers, restaurants, institutions and "sushi" shops that buy from the wholesale markets in the consuming areas; and finally the ultimate consumer.

The collection of distribution statistics is in 4 parts: (1) landing port survey; (2) consuming market survey (large markets only); (3) inventory of refrigerated products; and (4) processing survey.

There are about 3,000 landing ports in Japan (compared to a dozen or so in the United States). However, about 250 account for 95 percent of the catch. These are surveyed monthly for weight of landed fish and price at the landing market, by kind of fish. An annual survey of the entire 3,000 is made by a simplified interview system.

Fish are sold by the fishermen through their cooperatives, so that records are available as to catch, sales, and price at the various ports.

In about 250 landing ports surveyed monthly, the survey includes a classification of fish by use: (1) fresh consumption; (2) processing plants; and (3) inedible products, such as fish meal and fertilizer.

In about 144 of the landing ports, the Ministry traces the destination of the fish going for fresh consumption, by Prefecture and consuming center. This is accomplished by interviewing the shippers.

At 10 large markets, wholesale dealers are queried as to the landing port from which they received fish and the price they paid.

Information is collected from the railroads on total shipments by refrigerator car, but such data are of limited value as they relate only to shipments within a rail region. Data cannot be classified by cities, as rail records do not show inter-regional shipments.

Nearly 50 percent of total consumption is in 10 large cities.

In the major markets, surveys are made on the 6th, 16th, and 26th of each month to determine the quantity, price, and destination of fish. Each record shows the weight, value, and price per kilogram of (a) fresh fish, (b) whole-frozen fish, and (c) cut-frozen or salted fish. This is subsequently retabulated as to use and direction of shipment to 6 large cities, and to other cities.

There is a related summary form on an annual basis for 248 lesser markets by variety.

Cold storage holdings for fish products are surveyed. A total of 922 units with 400 tons per day capacity are included. Receipts, sales, and holdings by major species are surveyed.

#### Production Index

An index of physical quantities is computed regularly once a year. It uses Laspeyres formula for quantities, that is:

$$I_{oi} = \frac{\sum p_o q_i}{\sum p_o q_1} \quad \text{where "o" refers to 1960, and "i"}$$

to a given year. The prices and quantities relate to the following:

|                         | <u>Species</u> |
|-------------------------|----------------|
| Sea-catch               | 81             |
| Shallow sea aquiculture | 10             |
| Whales                  | 14             |
| Fresh water fisheries   | 29             |
| Fresh water aquiculture | <u>10</u>      |
| Total                   | 144            |

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